VOL. LXXX PART THREE

JOURNAL OF THE ROYAL HORTICULTURAL SOCIETY

MARCH 1955

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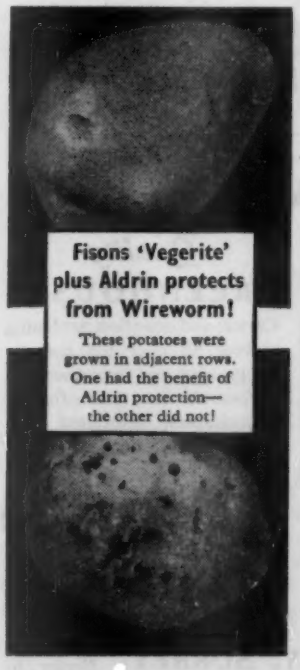
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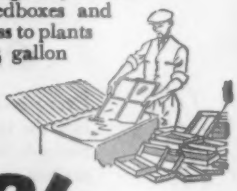

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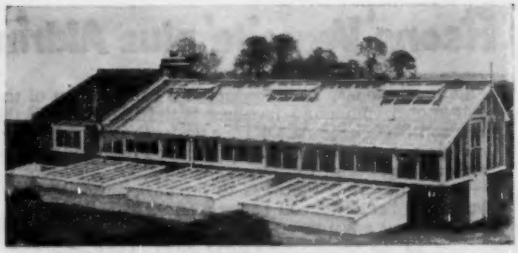

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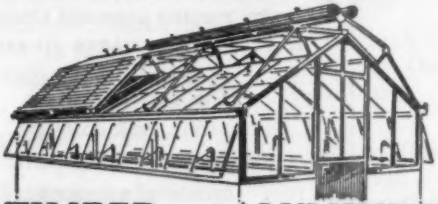

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JOURNAL OF THE ROYAL HORTICULTURAL SOCIETY

VOL. LXXX PART THREE

March 1955

THE SECRETARY'S PAGE

ANNOUNCEMENTS—MARCH AND APRIL

Shows

TUESDAY, March 8 12 NOON to 6 P.M. WEDNESDAY, March 9 10 A.M. to 5 P.M.	Fortnightly Flower Show.
TUESDAY, March 22 12 NOON to 6 P.M. WEDNESDAY, March 23 10 A.M. to 5 P.M.	Fortnightly Flower Show. British Orchid Growers' Association's Show.
TUESDAY, April 5 12 NOON to 6 P.M. WEDNESDAY, April 6 10 A.M. to 5 P.M.	Fortnightly Flower Show. Daffodil Competition. Alpine Garden Society's Show.
THURSDAY, April 14 12.30 P.M. to 6 P.M. FRIDAY, April 15 10 A.M. to 5 P.M.	Daffodil Show.
TUESDAY, April 19 12 NOON to 6 P.M. WEDNESDAY, April 20 10 A.M. to 5 P.M.	Fortnightly Flower Show. Camellia Competition. Sewell Medal Alpine-house and Rock-garden Plant Competition for Amateurs.
WEDNESDAY, April 27 1 P.M. to 5 P.M.	National Auricula and Primula Society's Show.

Lectures

TUESDAY, March 8, at 3 P.M. "Electric Heating in Horticulture" by MR. E. W. GOLDING, M.SC.TECH., M.I.E.E., M.A.I.E.E.

TUESDAY, March 22, at 3 P.M. "Orchid Hybrids and their Origin" by MR. D. F. SANDER.

TUESDAY, April 5, at 3 P.M. "Glasshouse Design and Management" by MR. W. J. C. LAWRENCE, V.M.H.

TUESDAY, April 19, at 3 P.M. Masters Memorial Lecture, "Light and Plant Growth," Part I, by PROF. R. H. STOUGHTON, D.SC., V.M.H.

Demonstrations at Wisley—The following demonstrations will be given at Wisley, that on the second day being in each case a repetition of that given on the first.

Flower Garden

March 2–3. The Pruning of Roses. (Commencing at 2 P.M.)

March 9–10. Seed Sowing and Vegetative Propagation of Alpines. (Commencing at 2 P.M.)

Fruit Garden

March 16–17. Pests and Diseases of Fruit Trees; Recognition and Methods of Control. (Commencing at 2 P.M.)

The Restaurant at Wisley—The Restaurant in the Gardens will be open at the following times during 1955:

March 30 to October 30 (excluding Good Friday)

Weekdays: 10.30 A.M. to 6 P.M.
Sundays: 2 P.M. to 5.30 P.M. (4.30 P.M. in October).

The restaurant will provide a cafeteria service of cold lunches, sandwiches, cakes, tea, coffee and other light refreshments. There will also be a waitress service for hot lunches. Organizers of parties wishing to make reservations for lunches or teas on days other than Saturdays or Sundays should make arrangements, not with the Society, but direct with the caterer, MRS. D. BADCOCK, either at the restaurant (*Tel.* Ripley 3329, during the above-mentioned hours) or at 18a St. James's Road, Sutton, Surrey.

Picnicking is not allowed in the Gardens.

NOTES FROM WISLEY

J. B. Paton

WITH the arrival of March one hopes for spring-like weather, not only to encourage plants to bloom, but also to persuade Fellows to visit the Gardens to see some of the loveliest flowers of the garden year. Some of the plants with bulbs and corms are the first to show off their merits, and none is earlier than the crocus of which by suitable choice of varieties it is possible to have a continuous succession of bloom from October to March.

Among those whose flowers appear after Christmas one of the first to be seen, in the Alpine House, is *Crocus chrysanthus*. This species is very variable with many forms ranging in colour from sulphur-yellow through white to lilac, with much flecking, feathering and speckling of darker colours on the outer segments. It may be confused with *C. biflorus* from which, however, it can be distinguished by its rounded gourd-shaped flowers which are orange throated and by the fact that the barbs of the anthers usually are tipped with black. Both belong to that group of crocuses known as the Annulate group whose members are distinguished from other crocuses by the lowest third of the tunic or outer skin of the corm splitting into a series of narrow rings which just overlap each other and though usually straight edged below are armed upwards with stiff teeth, which assist one ring to adhere to its neighbour. Noteworthy among the varieties of *C. chrysanthus* are 'Snow Bunting' with the outer petals of cream feathered with indigo and with the inner ones creamy-white and stained at the base with gold, and 'Warley White,' a seedling from *C. chrysanthus* var. *pallidus* with white petals, yellow throat and an exterior flushed with dark purple. In the yellow shades there are 'E. A. Bowles' with large globular yellow flowers suffused with brownish-grey at the base of the outer petals, the free-flowering 'Goldilocks' with deep yellow, bronze-suffused blooms, and 'Zwanenburg Bronze,' a striking variety in golden-yellow heavily marked with deep bronze.

C. biflorus is known as the Cloth of Silver or the Scotch crocus, and its forms have been so long in cultivation that it is doubtful if the original species is now available. The variety generally grown is an old garden form and nothing very closely resembling it has been found in the wild state. It has a slightly bearded yellow throat with white to lilac segments. Like all other old garden forms it is sterile and we have to rely on corm division to increase the stock. Of more recent origin from Mt. Troodos, Cyprus, is the pale lavender purple marked *C. hartmannianus*, first described as a new species in 1914.

The Aureus group is distinguished by the yellow flowers which are without a basal spathe, and in which the membranous tunics of the corms split into parallel fibres. At Wisley there are the rich orange

C. aureus, often listed by nurserymen as *C. moesiacus*, the Asia Minor plant *C. balansae*, yolk-of-egg yellow within and purple or brown marked without, and from Turkestan *C. korolkowii*, sometimes called the celandine crocus, on account of its widely expanded greeny-yellow flowers which are star-shaped.

There are four very closely related species in the Vernus group which have given rise to a series of hybrids which usually are called the Dutch garden or large-flowered crocuses. Down the Apple Walk, which runs parallel to the Herbaceous Borders, may be found a collection of these hybrids mainly derived from *C. vernus*. One of the most outstanding is 'Maximilian,' also known as 'Bleu Celeste.' It produces freely its soft china-blue medium-sized flowers, and is also a good plant for growing in pots. Of similar colour is the ageratum-blue 'Queen of the Blues,' which received an Award of Merit when shown by the Gardens in 1924. Of the purple-coloured ones there are 'Gladstone,' dark and shining with a reddish tinge, 'Sir John Bright,' an early-flowering purple-blue, 'Uncle Tom,' a late-flowering deep purple, and 'Ovidius,' a large-bloomed purple. In the violet shades there are 'Mikado,' 'Albion,' and 'Pallas,' all with petals of light violet striped with white, the last having deeper violet markings on the outer surface of the petals. Also to be seen in this collection is the large, pure white 'La Grandessa.'

C. veluchensis hails from the mountains of Greece and Turkey, and the Balkan countries, and is one of the Reticulate group, in which the tunics of the corms split into reticulate fibres. This species is reputed to have a weak constitution although recently a more robust stock has been collected which produces a charming white, lilac-tinged flower. Closely related is *C. sieberi* var. *atticus* from the mountains of Greece, with flowers in varying shades of lilac with orange throat and scarlet stigmata, and one of the easiest crocuses to grow in the garden. There is also a form of *atticus* whose blooms have a soft ground colour of lilac and markings of crimson, purple and white; it was raised by and named after MR. HUBERT EDELSTEN. Of the same group, though flowering not in the spring but in the autumn, is *C. sativus* var. *cashmirianus*, a good white-flowered variety of the saffron crocus. *C. sativus* is the crocus of the ancient world and is thought to be the Karkom of the Song of Solomon. Although saffron once was produced in England at Saffron Walden, in Essex, and used medicinally, our main supply for use in flavouring now comes from Spain.

Briefly let us now consider a few of the snowdrops which are well represented in the Wild Garden, due to the generosity of COL. F. C. STERN. Many keen gardeners speak of the snowdrop as if there was only one kind, whereas in fact there are many, and at Wisley it is possible to see representatives of seven species besides a considerable number of varieties.

The earliest to flower in January are the charming *Galanthus graecus*, native of Thrace and Bulgaria, seeding itself freely and always with

twisted leaves, and the deep green flat-leaved *G. rizehensis* found in Turkey by MR. E. K. BALLS and MR. BALFOUR GOURLAY.

Another early-flowering species, usually towards the end of January, is *G. byzantinus* which is intermediate in range and character between *G. elwesii* and *G. plicatus*. It has the wide folded foliage of *G. plicatus* and the flowers are similar to those of *G. elwesii*. *G. plicatus*, the Crimean snowdrop, found in the Drobuja and the Crimea, was introduced in 1818, and has deep green broad leaves folded at their edges. In other details it is very variable and at Wisley there is a double-flowered form as well as 'Warham Variety,' which received a First Class Certificate in 1937. This latter was brought by a CAPT. ADLINGTON from the Crimea about 1855 during the Crimean War.

G. elwesii from Asia Minor has more uniformly glaucous erect leaves than most snowdrops, and large flowers usually with deep green markings at the base of the inner segments. This species appears to appreciate a warm, dry, sunny position, whereas most snowdrops like to be planted in the shade of shrubs or in rough grass. Without doubt one of the best times to break up an established clump is just as the flowers begin to wither, as this allows replanting to be carried out at the correct depth.

Of *G. nivalis*, the common snowdrop, there are many forms and we have noticed, in particular, the beautiful 'Magnet,' which is a seedling from 'Melvillei.' It has long slender flower stalks which allow the expanded blossoms to sway to and fro in the breeze. One of the earliest and best-known forms is 'Scharlokii,' found in 1818 by HERR JULIUS SCHARLOK in the valley of the Nahe, a tributary of the Rhine. The outer segments of the petals are green tipped and the plant is distinguished by having two green spathe valves instead of the usual one. The Northumberland form of 'lutescens' is unusual in that it has a yellow ovary and yellow markings on the petals whereas all other snowdrops have a green ovary and markings.

Of the Caucasian snowdrop, *G. caucasicus*, there are early- and late-flowering forms. A reputed hybrid between *G. caucasicus* and *G. nivalis* is the free-flowering 'Neil Fraser.'

PLANTS OF INTEREST AT WISLEY DURING MARCH

GLASSHOUSES

Abutilon × *milleri*
Aphelandra pectinata
Chorizema ilicifolium
Correa × *harrisii*
Grevillea rosmarinifolia
Jasminum primulinum
Lachenalia varieties
Pimelea ferruginea
Tibouchina semidecandra

ROCK GARDEN AND ALPINE HOUSE

Draba aizoon
Fritillaria pudica
Hepatica acutiloba
Narcissus species and varieties
Omphalodes verna
Primula species
Pulmonaria angustifolia
Saxifraga species and varieties
Sisyrinchium douglasii

SEVEN ACRES

Erica arborea var. *alpina*
„ *carnea* and varieties
„ × *darleyensis*
„ *mediterranea*
Osmanthus delavayi
Prunus sargentii

BATTLESTON HILL

Camellia cuspidata
„ *japonica* varieties
„ × *williamsii* varieties
Magnolia kobus
„ *stellata*
Prunus varieties
Rhododendron species and varieties

WILD GARDEN

Erythronium dens-canis
„ *revolutum*
„ *tuolumnense*
Pieris floribunda
„ *japonica*
„ *taiwanensis*
Shortia uniflora

AWARD OF GARDEN MERIT COLLECTION

Daphne mezereum
Forsythia intermedia var. *spectabilis*
Magnolia × *soulangiana*
Prunus cerasifera var. *atropurpurea*

FRUIT RESEARCH AT LONG ASHTON

T. Wallace, C.B.E., M.C., D.Sc., F.R.S., F.R.I.C., V.M.H.

(*Lecture given on October* 5, 1954; DR. H. V. TAYLOR, C.B.E., D.SC., V.M.H., *in the Chair*)

As an introduction to this lecture it would seem desirable to refer briefly to the establishment and early history of Long Ashton, as this will serve to show how much of the present research work at the Station has developed naturally from the early investigations.

The Station was established, mainly on the initiative of the Bath & West & Southern Counties Society, as the National Fruit and Cider Institute, in 1903, with the object of placing on a firm basis the experiments on cider making that had been carried out during the previous ten years, with the support of the Society, by MR. R. NEVILLE GRENVILLE on his estate at Butleigh Court, near Glastonbury (Fig. 21). In point of age Long Ashton thus ranks second to Rothamsted among the research stations concerned with agricultural and horticultural research in Great Britain.

The original subjects of investigation of the N.F.C.I. related to cider making and fruit growing, the latter referring primarily to cider orcharding.

The Institute was thus primarily a West Country venture and supported almost wholly from funds contributed by the Bath & West Society, the cider fruit counties, and West Country farmers interested

in cider making and cider orcharding. From its inception the Institute also had a small annual grant from the Board of Agriculture. With a guaranteed annual income of £950 from the above sources the Institute established its premises at Long Ashton, comprising an office, a small laboratory and cider factory, with 13½ acres of adjoining land (on lease) on which to establish a cider nursery and orchards (Fig. 22). As scientific staff to carry out the experiments, a young Cambridge graduate, B. T. P. BARKER (later PROFESSOR BARKER) was appointed, and a labour staff was provided for the cider making and orcharding operations.

The work continued on this modest scale until 1912, when the Institute became associated with the University of Bristol and greatly increased grants were obtained from the Board of Agriculture from funds made available under the Development Act of 1909. Developments following from these arrangements resulted in the establishment of the Long Ashton Research Station as we now know it, with the scope of its investigations widened to include problems of fruit culture and the practical control of pests and diseases of fruit trees. The staff was substantially expanded and the farm of 257 acres, on which the premises were situated, was purchased for field experimental work.

The National Fruit and Cider Institute celebrated its Golden Jubilee in 1953, and to commemorate the occasion, a Jubilee volume, *Science and Fruit*, was published, in which the formation and development of the Institute are described, and a series of articles summarizes the main investigations carried out during the fifty-year period.

At the present time the programme of fruit investigations comprises the following subjects:

Cider and fruit juices; pomology, including cider apples and perry pears; plant breeding; nutrition of fruit crops; pests and diseases and their control, including insecticides and fungicides, entomology, plant pathology, spraying machinery and equipment; domestic preservation of fruits. In addition, the following subjects are included in the Station programme of research: the nutrition of plants and micro-organisms, with special reference to micro-nutrients; domestic preservation of vegetables and meat; the culture and utilization of basket willows. These latter subjects will not be discussed in the present lecture.

CIDER AND FRUIT JUICES

When the Institute was established in 1903 the bulk of the cider was made on farms in the West Country and consumed locally, mainly in the country districts. It could not in any way be considered a national drink.

The crude methods used in farm cider making had led MR. NEVILLE GRENVILLE to initiate his experiments at Butleigh, in 1893, for he was convinced that cider, if properly made, could become a high-class beverage, and contribute substantially to the prosperity of the cider fruit areas. These views have been fully substantiated during the past fifty years, for cider is now primarily a factory product, ranking as a

national beverage, and consumed alike by townsman and countryman throughout Great Britain. The technical development of the industry has been closely linked to the work at Long Ashton, for the Station has not only served as a research centre for cider making, but has also been the centre for advice and has played a part in educating the public in the pleasant qualities of cider and perry.

The researches on fruit juices and on other products of fruits have been natural developments of the cider investigations. They began as a war-time activity during the 1914–18 War with the manufacture of cider-apple jelly and the preservation of fruit by the use of a solution of sulphur dioxide, which has since been used as the main commercial method of preserving fruit pulp for jam-making. This early experimental work led to the establishment of the Chipping Campden Research Station, which has subsequently been developed as the centre for commercial canning and 'deep-freeze' investigations. The later work at Long Ashton has referred to the manufacture of apple and soft fruit juices, squashes, syrups and concentrates, fruit purees, fruit wines and even liqueurs. The work, in fact, can be considered as basic to many potential industries utilizing fruit, and its benefit to the nation was abundantly demonstrated during the 1939 war, when black currant and rose hip syrups played such important parts in supplying the Vitamin C content of children's diets.

The scientific problems underlying the manufacture of cider and fruit products are concerned with the quality of the raw materials, i.e. with suitable varieties and cultural conditions, harvesting and storage of the fruit, processing operations, in which the control or prevention of fermentation is important, the maturing and subsequent storage of products and the suppression of spoilage organisms, mainly bacteria.

In the early investigations on cider much attention was given to the question of suitable varieties and the effects of district, soil and cultural conditions on fruit quality. It was necessary to view the problems both from the cider makers' and farmers' angles: the varieties had to be of high vintage quality, but they had also to be good 'orchard trees,' resistant to pests and diseases, particularly to scab and canker. To this end single variety trials were prominent in the research programme, and trial orchards were established at appropriate centres in the cider growing areas. To keep the growers and makers in touch with the progress of the work, an annual Cider Tasting Day—on the first Thursday in May—was instituted and continued without a break until 1939.

These trials have enabled the Cider Advisory Committee of the Station to draw up a list of recommended varieties suitable for planting in the various cider-orcharding counties.

The cider-making investigations include both large- and small-scale factory experiments and detailed laboratory studies. These latter are mainly biochemical or microbiological in character, designed to study in detail the action of yeasts and bacteria during processing operations and their effects on quality. At present the biochemical studies include

the nitrogen, phosphorus and vitamin requirements of yeasts, the metabolic changes in organic acids during fermentation and the characterizing of the phenolic substances that comprise the so-called 'tannins' of cider.

In the fruit juices investigations, the chief studies have concerned apple juice and black currant syrup. In the former, attention has been given to the preparation of concentrates and the retention of quality, including retention of flavour and prevention of deposits. With black currants the main studies have related to ascorbic acid content, and to the effects of sulphur dioxide and low temperatures in preserving the vitamin and retaining the natural colour and a fresh flavour. Some attention has also been given to the juices of raspberries and strawberries, from which attractive products can be prepared.

POMOLOGY, INCLUDING CIDER APPLES AND PERRY PEARS

The investigations on cider varieties have been referred to in the previous section, but in addition to the general suitability of varieties for cider-making other detailed investigations are also in progress, among which may be mentioned the classification of varieties, their identification by growth characters and problems of pollination. Trials are also in progress to test the feasibility of growing cider fruit on bush trees with a view to increasing production. Recently a detailed study has been begun on the classification of perry pears which promises to be both fascinating and of great practical utility. At Long Ashton we think highly of perry as a beverage and the present pomological studies should do much to provide a basis for the production of the suitable raw material.

The main investigations in pomology over the years have been carried out under the general title of "Factors Affecting Fruit Bud Formation." In the early days they took the form of detailed investigations of the behaviour of fruit buds, and led to studies of Lorette pruning and the development of pruning methods for cordons and dwarf pyramids, of biennial bearing in relation to the position of fruit buds on shoots and to summer rainfall, to practices of bark ringing and bud notching, and more latterly to tree forms for apples, in particular to the modified leader tree, and to the renewal method of pruning elaborated by THOMPSON from his early work at Long Ashton.

Workers at Long Ashton have always been interested in the internal conditions of trees that are associated with vegetative growth and fruitfulness, and hence at one stage intensive investigations were carried out to test the carbohydrate/nitrogen theory of KRAUS and KRAYBILL. Typical of these investigations were those carried out on the nitrogen and carbohydrate fractions of shoots in relation to rootstock and manurial effects on growth and fruiting.

The present developments in this subject have been based on the theory of the hormonal control of plant growth processes and studies have included both practical and fundamental aspects. On the practical side synthetic growth regulators have been used in connection with the

rooting of cuttings, the parthenocarpic development of strawberry fruits, the prevention of "June drop" and preharvest drop of apples, blossom thinning, and the acceleration of fruit ripening. In the fundamental studies, special attention has been given to the problems of winter dormancy of black currants and apple seeds, and the natural hormones present during the early development of apple and black currant fruitlets. In black currant fruits at least three hormones have been found, two preventing the abscission of the fruitlets and the other causing cell elongation. One growth inhibitor has also been identified. The hormone picture in the developing apple fruitlet seems to be even more complex, and work to date has indicated the presence of no less than five growth-promoting substances and two inhibitors. The disappearance of one of these hormones has been correlated with successive waves of the "June drop."

The methods involved in these fundamental studies are very exacting, as the amounts of the hormones present are minute. The procedures involve the use of solvents for the extraction of the hormones from the plant tissues, and their qualitative identification by means of paper chromatography and biological tests, of which latter four are in general use—the Coleoptile cylinder test, tomato parthenocarpy test, coleus petiole abscission test and bean rooting test.

In recent work on apple rootstocks the possible use of apomictic seedlings of *Malus* species is being examined. In the event of useful stocks being found their use would lessen the risks of virus infection that may be spread by vegetatively propagated rootstocks.

FRUIT BREEDING

Fruit breeding projects, especially for tree fruits, are essentially long term, and it is not surprising that, although fruit-breeding investigations have been in progress at Long Ashton for about forty years, few of the selections made have as yet found their way into commerce. The main selections to date that appear of promise are as follows:

Apples: 'Cheddar Cross' ('Allington Pippin' × 'Star of Devon'), an early dessert apple; 'Worcester Cross' ('Cox's Orange Pippin' × 'Wealthy'), dessert, season early October; 'Taunton Cross' ('Wealthy' open-pollinated), dessert, season September to early October.

Pears: 'Bristol Cross' ('Williams' × 'Conference'), dessert, season fortnight before 'Conference'—this pear has gained a R.H.S. Award of Merit and is now being widely planted; 'Cheltenham Cross' ('Dr. Jules Guyot' × 'Conference'), dessert, season early September (Fig. 24).

Plums: 'Severn Cross' and 'Thames Cross' (both 'Coe's Golden Drop' × 'Giant Prune'), dessert, late and mid September respectively; 'Teme Cross' ('Heron' open pollinated), dessert, season as 'Victoria.'

Black Currants: 'Mendip Cross' ('Baldwin' × 'Boskoop'), season slightly ahead of 'Boskoop'; 'Cotswold Cross' ('Baldwin' × 'Victoria'), season as 'Baldwin'; 'Malvern Cross' ('Baldwin' × 'Victoria'), season slightly after 'Cotswold Cross.'

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... but recent experiments using

slightly after Coleswold Cross.

It should be noted that the Long Ashton seedlings are all given West Country names to which Cross is added: apples and pears are named after towns, plums after rivers and black currants after hills.

In future, it is likely that the plant-breeding programme will mostly concern cider apples and perry pears and black currants; for the other fruits, programmes are likely to be restricted to points of special interest or to the filling in of obvious seasonal gaps.

NUTRITION OF FRUIT CROPS

Work on this subject was begun in 1920 and in view of the confused ideas on nutrition at that time the first experiments to be made were with sand cultures in which the object was to determine the effects of deficiencies of the major mineral nutrient elements.

The experiments paid early dividends as they showed that "leaf scorch" symptoms, at that time associated with numerous failures in commercial plantations, resulted from a deficiency of potassium. It was also shown that the symptoms associated with the so-called "grass effect" were those of nitrogen deficiency.

These two results were quickly followed up by field experiments in which the results of the pot experiments were shown to apply to the field problems.

Further points of interest shown in the early experiments were the symptoms of magnesium deficiency and the importance of the ratios nitrogen/potassium and potassium/magnesium in the nutrient medium. These experiments were followed by special investigations on leaf scorch, lime-induced chlorosis—for which the beneficial effects of a grass cover were demonstrated, foliage leaching, chemical investigations on leaf composition in relation to nutrient status, and soil surveys to examine the relationships between soil conditions and the growth and fruiting characters of the various fruits. These last studies provided a sound basis for advising on the establishment of commercial fruit farms on suitable soils.

In the experiments on leaf scorch it was shown that the whole of the potassium needed by gooseberries could be supplied by foliage sprays and also that "scorched" apple trees on potash deficient land could often be cured and healthy conditions restored by the use of a permanent grass cover combined with suitable grass-cutting treatment.

In subsequent work the investigations were extended to problems of trace element deficiencies, the effects of orchard conditions on fruit quality and storage properties, and to detailed studies of cultural systems in relation to manurial practices.

At the present stage, it may be said that a good working knowledge of the effects of the mineral nutrients on the various fruit crops has been gained, and we also know how to prevent and cure the various mineral deficiencies that may occur. Iron deficiency, until recently, has proved the most serious problem to overcome, but recent experiments using

chelated compounds of iron, indicate that this problem also is now well on the way to solution.

The main practical problems as we now see them are to determine the best cultural practices to adopt to ensure the best effects on tree nutrition and soil structure, and to find how to make the best economic use of manures and fertilizers.

As regards cultural systems, the most important problems are in connection with tree fruits, and the questions centre largely around the use of various grasses and clovers for permanent swards, and the management and manurial practices to be adopted in conjunction with these. At Long Ashton, we have already shown how the status of potassium, phosphorus and iron may all be substantially raised by permanent grass, and our experiments have demonstrated beyond all doubt the superiority of grass over arable culture for apples under Long Ashton conditions (Figs. 25 and 26).

With regard to the use of fertilizers, the efficiency of various nutrients as at present applied is relatively low, and large savings should be possible. Here we look to cultural systems and the use of sprays as possible methods of improving present practices. For example, the superiority of magnesium sprays over soil applications has been firmly established, and urea sprays show promise for some problems of nitrogen supply.

These subjects are prominent in the Long Ashton programme.

PESTS AND DISEASES AND THEIR CONTROL

(a) *Insecticides and fungicides:* Thirty years ago the insecticides and fungicides available to the fruit grower were few and mostly unsatisfactory in the forms in which they were applied. As insecticides, nicotine, quassia and paraffin, used with soft soap, and lead arsenate were used, while copper, chiefly as Bordeaux Mixture, was the main fungicide. Lime-washing was practised as a means of killing overwintering insect eggs, but had little effect. In those early days Long Ashton workers were interested in producing an egg-killing winter wash and were also studying the fungicidal properties of Bordeaux mixture with particular reference to scab control.

In 1921, S. P. WILTSHIRE, mycologist at Long Ashton, introduced the first tar-oil wash, a sample of "Carbolineum," from Holland, and experiments were made with it at the Station. Its effectiveness as an egg-killing wash was soon demonstrated, and shortly afterwards a chemist was appointed to determine the active egg-killing constituents, which were soon shown to reside in the neutral, high-boiling fraction of the tar-oil. These investigations, together with the introduction of lime sulphur at that time as an acaricide, were instrumental in bringing together in joint investigations the Station chemist, entomologist and mycologist, who developed their respective subjects with a view to evolving a comprehensive spray programme. From that point the chemical investigations have kept pace with the various developments that have taken place in regard to spray chemicals.

Since the war particular attention has been given to the mode of action of D.D.T. and to problems arising from the use of the organic phosphorus compounds. Much attention has also been given to problems concerning the effects of formulations and methods of application of sprays on the pattern and persistence of spray deposits, in relation to the duration of their toxicity, the degree to which they are absorbed by leaf and fruit tissues, and the consumer hazards thereby involved. As many of the substances used are relatively new and of complicated organic structure, special attention is being given to analytical methods for their detection and estimation in spray deposits and for following the changes they may undergo within the plant. The particular importance of this work has been recognized by the Agricultural Research Council by the establishment of a special analytical section at Long Ashton (Fig. 28).

(b) *Entomology:* In the period between the two great wars, the entomology section played an important part in the control of a succession of pests, such as capsid bugs and apple sawfly, and in testing the efficiency of various insecticides emanating from the chemical section. During the course of this work the head of the section became more and more convinced of the need to improve spraying methods, and began a series of investigations on spraying equipment and methods of applying sprays against particular pests. This has led to detailed studies on the compounding of spray fluids, the droplet size of sprays, and designs of spray nozzles and spraying machines for special purposes. This work was put to practical use during the 1939–45 war and has been continued and expanded since 1946. Other problems that have been studied in the post-war period have been the action of systemic insecticides and the changes they undergo in plant tissues, and the determination by bio-assay methods of the toxicities and mode of action of the numerous new compounds introduced as insecticides.

These investigations have called for highly refined techniques, involving radio-active phosphorus, delicate electronic apparatus and biochemical investigations of enzyme systems of pests.

PLANT PATHOLOGY

From the very beginning of the Long Ashton investigations on cider orchards, apple scab and apple canker were recognized as outstanding diseases seriously limiting the production of cider fruit, and with the extension of the work to commercial apple production their importance became still further emphasized. Thus as early as 1914 intensive investigations were begun on the life histories and orchard characters of the apple and pear scab fungi. Since that time studies of these organisms and methods for their control have continued without break, as their importance in apple and pear production has remained undiminished. Canker, also, has been under continuous investigation and still remains a major problem in many orchards.

At present the main interest in scab investigations centres around

the problem of replacing lime sulphur, which is liable to damage the foliage, by newer fungicides that will also control other fungus troubles such as mildew.

Canker has proved a most intractable problem, due to its mode of infection and the long period throughout the year during which infection can occur.

Other fungus problems receive attention as they arise, mainly in connection with the field aspects of their control. Recently experiments have been started to examine the possibility of controlling one of the main storage rots of apples—*Gloeosporium perennans*—by orchard sprays. Another fungus under detailed investigation is *Pseudopeziza ribis*, which causes leaf spot of black currants.

A novel line of investigation during recent years has been that of systemic fungicides, following the pioneer experiments of CROWDY at Long Ashton and WAIN at Wye College. The substances examined for systemic properties are generally closely related to the synthetic hormones.

Other interesting studies in progress, relating to fungal action and the effects produced by fungicides on particular fungi, concern host-parasite relationships and the effects of fungicides on the enzyme systems of the pathogenic organisms.

Although virus diseases have not been a major subject of investigation at Long Ashton, valuable contributions have been made, and at present work is continuing on a number of viruses of tree fruits. The first virus disease to be investigated at Long Ashton was "reversion" of black currants, which LEES showed to be transmissible by grafting. Later, the following viruses were identified in tree fruits: Rubbery Wood, Chat Fruit, Mosaic and Flat Limb, all in the apple variety 'Lord Lambourne' and later in other sorts, also False Sting in the cider variety 'Sweet Alford'; in pears, Stony Pit in several varieties and notably in 'Doyenné du Comice' and 'Pitmaston Duchess'; in plums, a dwarfing disease, named Plum Stunt; various virus diseases of sweet cherry were also recognized by DR. WILLISON of the Dominion Laboratory of Plant Pathology, Canada, whilst working at Long Ashton. The disease Rubbery Wood was first shown at Long Ashton to be carried in commercial apple rootstocks, and recently the Chat Fruit virus has also been shown to be present in some of these.

The main virus investigations now in progress consist of field investigations, and include the indexing of rootstocks, transmission of virus infections by grafting, and surveys of the distribution of the various diseases. The work is conducted in collaboration with the pomology section.

SPRAYING MACHINERY AND EQUIPMENT

Some reference to this subject has already been made under entomology since the investigations are carried out in that section.

The studies have included the performance and use of machines

for various purposes, with particular reference to the efficiency of the spraying operations in controlling pests and diseases, damage to foliage and fruits, convenience of use in orchards and the economic use of labour. Machines of various sizes and designs have been built at Long Ashton for these studies; they have included the usual power sprayers for use with hand-operated lances, high pressure automatic 'mast' sprayers and an 'air-flow' mist sprayer. These machines have not only proved of value for orchard work in this country, but have been adopted for the spraying of crops in the Colonial Territories, and one has been specially built for the spraying of ground swarms of locusts in Africa.

DOMESTIC PRESERVATION OF FRUITS

When the investigations on commercial canning became well established at Chipping Campden, the work on domestic preservation methods was transferred to Long Ashton. In the early years, the work was mainly educational, but as the subject has developed in the country, through the activities of County Education Committees and Women's Institutes, the need for research has been evident, and Long Ashton has been equipped as the national research centre for the subject, which includes fruit, vegetables and meat products. The section also holds annual courses in methods of preservation and produce judging, intended primarily for instructresses in these subjects.

In addition to laboratory facilities, there is a well-equipped experimental kitchen, fitted to carry out tests of various types of heat treatments and deep freeze methods.

The object of the research work is to evolve methods of preservation that are both safe and simple, and capable of being carried out in a normal kitchen.

The experimental work involves microbiological and chemical investigations and tests to determine the effects of the various treatments on the keeping qualities and food values of the products.

The methods adopted as the result of the tests are made available to the general public by means of Bulletins published by the Ministry of Agriculture.

CONCLUSION

In the time available in this lecture it has been possible to give only a very brief summary of salient points of the investigations relating to fruit that are carried out at Long Ashton. Whilst many subjects of importance have, of necessity, had to be omitted, I hope that the sketch I have given will suffice to show the many ways in which the Station is contributing to the advancement of knowledge of fruit growing and the utilization of fruit crops.

DWARF SHRUBS OTHER THAN ERICACEOUS PLANTS AND CONIFERS

H. G. Hillier

(*Lecture given on June* 29, 1954, *the* HON. LEWIS PALMER, V.M.H., *in the Chair*)

THE subject, "Dwarf Shrubs," as originally suggested to me, is so wide that it seemed to me desirable to limit its scope, so I decided to omit ericaceous plants and conifers. Furthermore, I have confined my choice to plants which, if correctly sited, are hardy in the Home Counties.

Whilst several of the plants are excellent subjects for the wall garden or rock garden, I have endeavoured to choose plants which may be grown in the low shrub border or towards the front of a larger shrubbery.

Socialism as we know it has the effect of levelling down; thus in our lifetime we have witnessed a revolution in the garden as much as elsewhere. This change in fashion has not only modified our British gardens, but from the United States of America come requests asking to be recommended dwarf shrubs suitable for the small "yards" of New England. With smaller gardens, less labour and rising costs, the dwarf shrub border has much in its favour. There is perhaps no other form of gardening which gives so great a return for so little effort.

The "Goat's Thorn," *Astragalus angustifolius* of the Mediterranean region, is an exceedingly slow-growing flat-topped spiny shrub seldom exceeding a foot high. The leaves about 2 inches long are pinnate and composed of many tiny grey-green leaflets. The leaf stalks remain after the leaflets have fallen and become hard, stiff spines. The typical leguminous flowers are a soft lavender grey.

There are several good barberries which claim our attention. A very attractive low hummock is formed by *Berberis tsangpoensis*, a comparatively recently introduced species showing kinship with *B. concinna* but apparently hardier and less evergreen. The leaves, glaucous beneath, give good autumn tints and the yellow flowers are followed by large red berries. Another excellent miniature among Barberries is the little-known *B. taliensis*, a rigid, slow-growing, compact evergreen with narrow, polished dark green leaves and sulphur-yellow flowers which, like other truly evergreen species, are followed by blue-black berries. *B. darwinii* and one of its progeny, *B. stenophylla* (*B. darwinii* × *B. empetrifolia*), are deservedly two very popular shrubs which have given rise to conspicuous dwarf forms. *B. darwinii prostrata*, red in bud with orange-yellow flowers, forms a spreading shrub to about 2 feet high. *B. stenophylla corallina compacta*, a globular shrublet wit htiny orange-yellow bells. *B. stenophylla gracilis* is taller with slender arching branches.

Chaenomeles, better known as *Cydonia*, and familiarly as "Japonica," comprises several colourful dwarf varieties. *C. superba* 'Knap Hill Scarlet' with its large bright orange flowers has been inappropriately termed scarlet. It is a first-class shrub seldom above 3 feet when grown in the open. The variety 'Simonii' is a low, flat-growing bush with deep blood-red flowers. *C. japonica* 'Boule de Feu' has apricot-coloured flowers, and the variety 'alba' forms a compact bush with creamy white blossoms.

The rock roses will grow in any well-drained soil in the full sun. *Cistus Bourgaeanus* survived this last winter without injury. It is a somewhat lax plant about 1½ foot high with dark, linear leaves about 2 inches long and white flowers. *C. loretti* is a spreading plant with exceptionally large white flowers, each petal with a crimson basal blotch. Perhaps the most popular *Cistus* is the natural hybrid ' Silver Pink.' The flowers, a lovely art shade of silvery pink, are carried in many-flowered clusters.

The cotoneasters are a very diverse group of shrubs embracing several really worthy dwarf species. *C. conspicua decora* is very attractive in flower and as a winter berrying shrub is in the front rank. Frequently this evergreen is included in the winning group in the amateur, autumn shrub competition. *C. dammeri* (*humifusa*) is an excellent ground cover plant. Its trailing shoots are studded in winter with sealing-wax-red berries. If grown over rocks or other support it assumes the shape of the object over which it clambers. *C. microphylla* is a vigorous, low, spreading shrub with small, dark, polished leaves and rather large, dull purple-red fruits, often used as an evergreen creeper for a north or east wall. Its variety *thymifolia* is a pleasing smaller-leafed form which looks well draping the side of a retaining wall. *C. congesta* is by some botanists referred to this species and is not too infrequently labelled *C. pyrenaica*. In berry this plant is more like *C. dammeri* than *C. microphylla*; it has a delightful habit of growth forming a series of mole hillocks. For those who like coloured foliage, *C. horizontalis variegata* recommends itself. The silver variegated grey-green leaves are usually pink tinted, and as autumn approaches the semi-persistent leaves increase in intensity of colour.

Several dwarf brooms demand inclusion by the massed effect of their floral wealth. *Cytisus praecox* with its cascading waves of cream may be a little tall to include in this paper, but *C. kewensis* with its flowers a tone paler makes an excellent miniature waterfall. *C. Beanii* is a semi-prostrate compact bush with quantities of buttercup-yellow flowers. I really should not mention *C. demissus*. It is not for the shrubbery, but since I have built a retaining wall to house it and a few other gems of its calibre, I cannot forget it, with its slender creeping stems carrying inch-long buff-yellow flowers. It holds among chalk plants rather the same position as the creeping *Rhododendron* 'Elizabeth' in the acid plant world. *Cytisus purpureus* gives a very distinct colour break and if one has space for only one purple broom then plant the variety

atropurpureus. It has larger richer flowers. The albino form is also an excellent plant. It will be remembered the "Purple Broom" made history by joining with the laburnum to make the graft hybrid *Laburnocytisus adamii*. *Cytisus purpureus* also created a natural hybrid by crossing with one of the yellow brooms, probably *C. ratisbonensis*, to make *C. versicolor*, a very good dwarf shrub with its flowers half-way between yellow and purple.

C. procumbens is a shrub of prostrate habit attaining about 1½ foot high. Native of the mountains of S.E. Europe, it forms patches spreading 2 or 3 feet across, which in May become covered in bright yellow flowers.

Daphnes have a somewhat aristocratic air, perhaps because if left to fend for themselves they are one of the first group of plants to succumb to the bustle and jostling of more vulgar elements. I once suggested that there should be a hand-list prepared and printed of the plants growing at Wisley. Several learned Councillors immediately turned down the suggestion, and as they were owners of some of the best gardens in the country, I pictured the magnificent plants that once adorned those gardens for a few fleeting years or even months and are no more. I recalled seeing in 1931 a moist, shaded mossy bank covered with the yellow *D. aurantiaca*. This plant is not now to be seen within probably fifty miles and the present owner does not now know that this gem once flourished in his garden. *D. arbuscula* is a gem of quite good constitution with its typical purple flowers nestling among long linear leaves. It is less than a foot high. From the European Alps comes *D. alpina*, a compact bush a foot high with fragrant white flowers. *D. blagayana* requires a better habit of growth before it can be regarded as a first-class shrub. Its large terminal clusters of very fragrant cream-white flowers are all that can be desired. Its ungainly prostrate branches are best layered by a piece of flat stone. Like other members of the genus, it requires a moist yet well-drained soil, which should comprise a good sandy loam rich in leaf-mould or peat. It seems that this species prefers half shade, but I believe all daphnes like the sun provided they can have a cool moist root run. All daphnes are lime tolerant, but none really succeed in a dry shallow soil over chalk. If one's choice was confined to one daphne, I expect most would vote for *D. cneorum*, but the taller deciduous winter-flowering *D. mezereum* would be a close second. *D. cneorum eximia* has perhaps fewer but rather larger and deeper coloured flowers. The white-flowered form has become a very rare plant. *D. collina* is a good "all-rounder," a neat, compact evergreen rarely a little more than 2 feet high with fragrant, rose-purple flowers backed by dark green, obovate leaves. *D. retusa* is one of the toughest members of the family and its short thick growths soon create the effect of a comfortable maturity. It has firm, ovate leaves, and comparatively large purple flowers. *D. tangutica* is a very closely related species with rather longer and narrower leaves. Our grandparents regarded *D. odora* as a greenhouse plant, but this beautiful shrub with its powerfully scented flowers is able to withstand low temperatures

approaching zero. The variegated form *aureo-marginata* appears to possess a stronger constitution than the type. Daphnes are claiming too large a place in this paper, but even so for real garden merit *D. neapolitana* cannot be excluded. It is as near as can be the perfect dwarf shrub—a dense, rounded evergreen bush little more than 2 feet high with a mass of rose-purple, very fragrant flowers in May. It is regarded as a hybrid, probably between *D. collina* and *D. cneorum*, though I see BEAN suggests *oleoides* × *cneorum*.

The blue "Hedgehog Broom" from Spain, *Erinacea pungens*, needs full sun and good drainage, conditions best found on the rock garden. Under favourable conditions it makes a rounded, spiny hummock like the back of a hedgehog. The purple-blue flowers appear in April and May.

All the *Hamamelidaceae* do best on an acid or neutral soil and apart from *Parrotia* they tend to die out in the course of years when planted on dry shallow chalky soils. *Fothergilla gardeni* is a pleasing dwarf member of this order, a slender-branched shrub attaining 2 or 3 feet high and carrying in April and May terminal clusters of white bottle-brushes.

Small botanical differences divide the brooms into *Cytisus* and *Genista*. With one exception, the latter have yellow flowers and include several very pleasing dwarf shrubs. *Genista glabrescens* is an alpine shrub forming a compact densely branched shrub seldom exceeding 2 feet high. The bright yellow flowers crowd the twigs in May.

G. horrida can easily be mistaken for a good strong plant of the "Hedgehog Broom" and like that plant is often rather sparsely flowered, but it is so distinct among the *Genistas* with its neat flat-topped tufted habit as to make it worthy of inclusion in a representative collection.

G. januensis is so much a rock-garden subject with low, spreading triangular stems that its inclusion here is scarcely appropriate, but *G. lydia* which suggests a much enlarged edition of the "Genoa Broom" is a very worthy subject for this talk. It reaches 2 feet high and carries its yellow flowers in June on its pendulous intertwining branches. *G. pilosa* is a procumbent shrub reaching 1½ foot high. It occurs wild in Southern England and makes a good ground cover plant for a dry sunny position.

Halimium is a small genus of floriferous, rather dwarf shrubs which, until recently, were generally known in gardens as *Helianthemums*. They form a link between this latter genus and *Cistus*. Like their associates, *Halimiums* succeed best in light well-drained soil in the full sun, and are one of the first group of plants to suffer if the ground becomes waterlogged. *H. lasianthum*, more popularly known as *Helianthemum formosum*, is a low, spreading shrub, with sage-green leaves and, in June, bright yellow, saucer-shaped flowers with a purple-brown blotch at the base of each petal. These blotches are missing in the variety *concolor*. *H. ocymoides* is an equally beautiful shrub with flowers and leaves similar in colour to *H. lasianthum* but differing in its compact

erect habit of growth. A white-flowered species, *H. umbellatum*, attains about 1½ foot. The linear bright green leaves are only likely to be confused with those of *H. libanotis*, but this plant though similar in having rosemary-like leaves has buttercup-yellow flowers.

Any well-stocked garden should now include at least one of the several bigeneric hybrid *Halimiocistus*. Unfortunately, the most beautiful is the least hardy *H. wintonensis*, a chance hybrid believed to be *H. ocymoides* × *C. salvifolius*. It attains about 2 feet, has rather bullate, grey-green leaves and perfectly formed saucer-like, white flowers with a central zone of crimson-maroon contrasting with the yellow blotches at the base of the petals. *H. ingwersenianus* and *H. sahucii* are both excellent low, spreading shrubs with white flowers, which have occurred as natural hybrids in Portugal and the South of France, respectively.

'Parker's Jasmine' comes within the scope of my subject. *J. parkeri* is a more or less evergreen shrublet less than 1½ foot high with yellow blossoms in June not unlike those of the popular "Winter Jasmine."

The shrubby potentillas are a small group of shrubs which until recently have been neglected, but it is obvious that within their ranks are several of the most perfect garden shrubs, ideal in size for the small garden, very floriferous over a long period, hardy, succeeding in any type of fertile soil, preferring moisture but tolerant of really dry conditions. Sad to relate we have lost recently by death ARTHUR J. IVENS, F.L.S., who knew more about this group of plants than anyone else, and his untimely death came before he had completed a monograph he was writing. *Potentilla fruticosa* is found wild in various forms in both the New and Old Worlds and extends from Britain through the northern hemisphere to Asia. There is no more delightful small shrub than the variety *beesii*, with which is synonymous *nana argentea*, displaying its golden flowers on mounds of silver foliage. Variety *parvifolia* is a little taller to about 3 feet. The erect stems are pendent at their extremities. The leaves are small and gracefully poised and the abundance of yellow flowers appears from May to September or even later. The variety *veitchii* has pure white flowers, a rather more lax and more graceful shrub than the rigid and erect variety *beanii* (*leucantha*), which also has white flowers.

P. fruticosa mandschurica is a very attractive geographical variety forming a low, spreading shrub, the large white flowers being disposed on mats of grey-green foliage. *P. arbuscula* is a very distinct shrub with branches which are shaggy owing to being loosely enwrapped in large brown stipules. Its large rich yellow flowers appear continuously from mid-summer to late autumn. The accompanying plate (Fig. 29) depicts an attractive form of *P. fruticosa* described as variety 'Katherine Dykes.' This plant is not so appropriate as some of the shorter-growing varieties referred to since it will attain 5 feet in height. It is a plant of rather compact habit and carrying an abundance of deep cream coloured flowers.

There are a few dwarf *Prunus* which merit inclusion, and among

them *P. prostrata* which was first introduced from Mt. Lebanon in 1802. It is perhaps because there are poor as well as good forms of this species that it has not become better known. Given the full sun and a favourable season, this "Mountain Cherry" is a charming shrub of spreading habit and less than 3 feet high. The flowers are produced in May singly or in pairs, which in a good form are rich carmine in bud opening a clear pink. I recall some years ago raising seeds received from Moscow Botanical Gardens which produced disappointingly pale flowers. If asked to recommend the best dwarf *Prunus* I suppose the reply would be *P. tenella gessleriana*, the best form of "Dwarf Russian Almond" and better known in gardens as *Amygdalus nana* 'Fire Hill.' A low suckering shrub, the rich carmine-pink flowers wreath the erect, leafless branches in April. The fading flowers are finally hidden by the unfolding leaves.

The "Rocky Mountain Cherry," *P. besseyi*, usually attains about 3 feet high and in some parts of the United States is being grown as an edible fruit-bearing shrub. In this country it is ornamental when its glabrous, polished branches are crowded with white flowers just as the leaves are unfolding, and again in the autumn when its red leaves are some of the most brilliantly coloured of dwarf shrubs.

The red-flowered currants are among the most popular and easily grown of spring-flowering shrubs, but as yet too little attention has been given to the late winter-flowering evergreen *Ribes laurifolium*, with its racemes of greenish-yellow flowers in February and large, persistent, leathery leaves, sometimes exceeding 4 inches long. Although reputed to grow taller, I have not seen this shrub above 2½ feet high in the open. The male and female flowers occur on different plants, and I believe the late HON. VICARY GIBBS put the name *R.* 'Vicarii' to the male form. Another plant of quality and character but without conspicuous flowers is *R. henryi*, a low evergreen shrub with large orbicular-ovate leaves. In the southern counties it appears to need a shaded site to grow successfully.

Under the group name "Fairy Rose" there are in cultivation an attractive range of varieties, the oldest of which probably have a common origin and may be conveniently classed under *R. indica minima*. These miniature roses, flowering from May until October, make delightful subjects for the dwarf shrubbery, top of the retaining wall, or as edging plants, with their tiny leaves, and flowers mostly double and perfectly formed. ' Oakington Ruby ' is a good ruby-crimson, 'Little Princess' white and 'Rouletti' pink.

The willows vary from creeping alpines to giant trees and between these extremes are several attractive dwarf shrubs which call for inclusion. The "Woolly Willow," *Salix lanata*, a rare native of North Britain and high latitudes in Europe and Asia, is a beautiful shrub, especially in the early part of the summer, when its large orbicular-ovate leaves clothed on both surfaces with silky hairs glisten with a silver-grey sheen. *S. boydii* is another willow of quality which might

be described as the "Miniature Woolly Willow." In fact it is regarded as a hybrid between the prostrate creeping *S. reticulata* and probably *S. lapponum*. Its round grey leaves and silver catkins make it a beautiful little plant. Another very lovely small willow which has recently found its way into our gardens is *S. wehrhahnii*. Its thick, twisted stems soon lend an air of antiquity and in the early spring when bescattered with silver catkins it is quite enchanting.

Sarcococca humilis is a most accommodating dwarf evergreen with dark, polished green leaves and tiny, fragrant flowers in late winter. It makes a compact tuft of erect stems from 1 to 2 feet high. It may be grown in any fertile soil and prefers shade.

Another shade-loving family of useful shrubs is *Skimmia*. *S. fortunei* is a compact tough evergreen about 2 feet high carrying throughout the winter conspicuous panicles of large red berries. The type plant will not succeed for long on chalky soils, but a staminate form, *rubella*, is reasonably lime-tolerant and well earns its inclusion in a select list of dwarf shrubs as a conspicuous flowering evergreen with erect panicles of red buds and soft pink flowers early in the year.

The comparatively common *S. japonica* has the male and female flowers on different plants. There are, however, hermaphrodite plants most of which appear to have a common origin *S. fortunei* × *S. japonica*. One of the best of these is *S. rogersii* of which there is a slow-growing compact variety, *nana*, recognizable by the slight twist of its leaves.

There are several St. John's Worts which qualify for mention but it must suffice to name but three. *Hypericum uralum* about 2½ feet high, a fascinating, Nepalese, semi-evergreen shrub related to but hardier than *H. patulum*, and a more elegant plant smaller in all its parts. Flowers golden-yellow carried in cymose clusters during late summer and early autumn. *H. moserianum* combines the best qualities of its parents *H. patulum* and *H. calycinum* and is an excellent low evergreen shrub for almost any situation. Flowers rich yellow 2 to 2½ inches across produced throughout the last half of the summer and early autumn. It is evergreen except in the severest winters and makes compact clumps about 1½ feet high and twice as wide.

A very valuable garden shrub as yet little known in cultivation is *H. kouytchense*. It attains about 3 feet, the terminal, oblong-elliptic leaves persist throughout the winter but the older leaves give a good show of autumn and winter colour before falling in the late winter. The flowers which appear from mid summer to the early autumn are deep yellow, almost old gold.

Among the hydrangeas the comparatively dwarf and compact species *H. serrata* is a worthy plant for any shrubbery and the most attractive form is that separated as variety *acuminata* with red and blue ray florets. This attractive Japanese shrub flowers in July and August.

When I visit for the first time a garden rich in plants I usually bring away with me a general impression which mellows and grows hazy as

Photo, L. S. Clarke

FIG. 20—*Dahlia imperialis* at the John Innes Horticultural Institution, Bayfordbury (See p. 135)

FRUIT RESEARCH AT LONG ASHTON

FIG. 21—MR. ROBERT NEVILLE GRENVILLE, who initiated research on cider making, in collaboration with The Bath & West & Southern Counties Society, at Butleigh Court, Glastonbury, in 1893. The building shown is the cider laboratory at Butleigh Court. The experiments led to the establishment of the Long Ashton Station in 1903 (See p. 110)

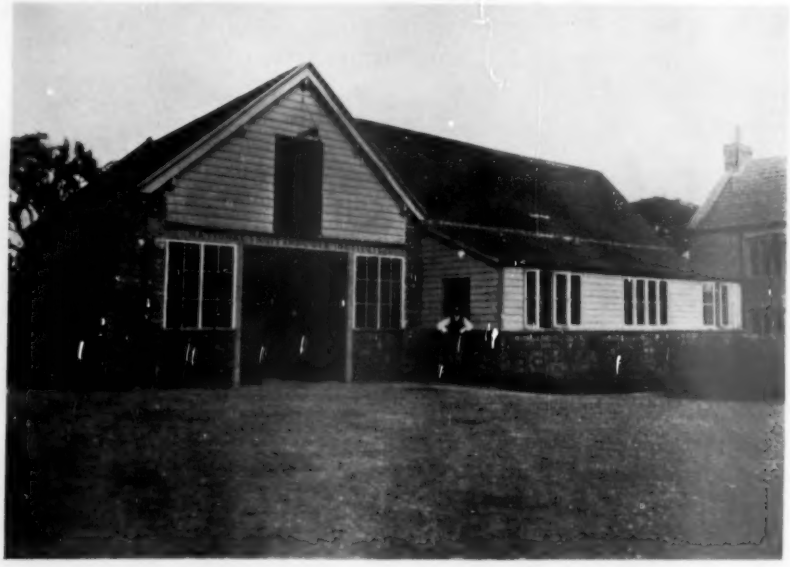


FIG. 22—The original laboratory and experimental cider factory at Long Ashton—1904 (See p. 111)

FIG. 23—A farm cider press, showing the pulped apples made up into a "cheese" ready for pressing

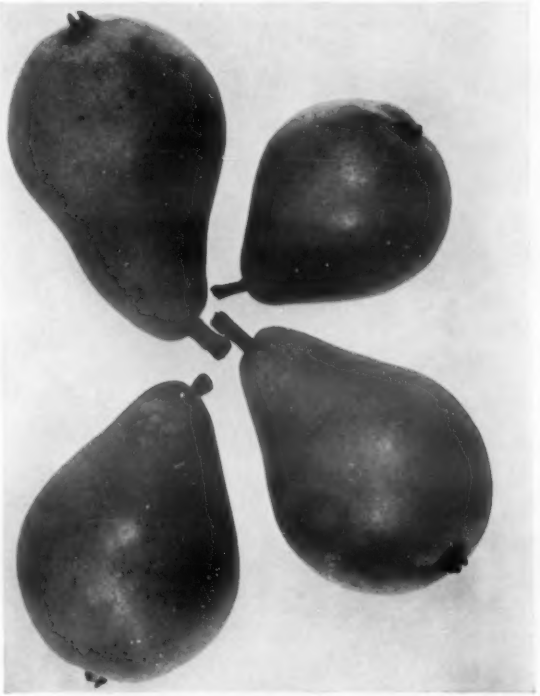


FIG. 24—Pear 'Bristol Cross' ('Williams' Bon Chrétien' × 'Conference'). R.H.S. Award of Merit (1953). Bred by MR. G. T. SPINKS (See p. 114)

FIG. 25—Cultural systems for apples. 'Dabinett' cider apple trees growing under permanent grass sward (compare Fig. 26). Note good growth

FIG. 26—Cultural systems for apples 'Dabinett' cider apple trees growing under arable culture (compare Fig. 25). The ground cover shown is annual weed. Note poor growth (See p. 116)

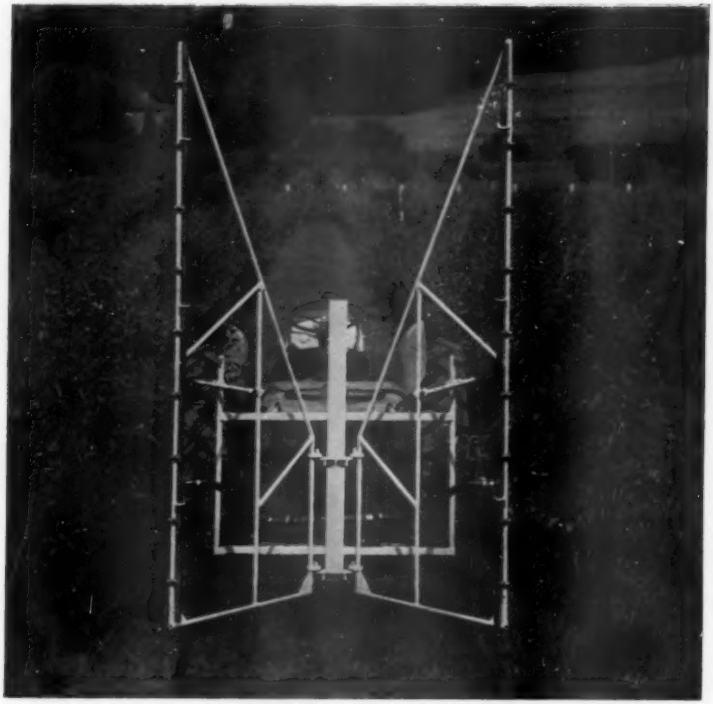


FIG. 27—Automatic sprayer for use in Dwarf Pyramids and Cordons. Designed by DR. H. G. H. KEARNS

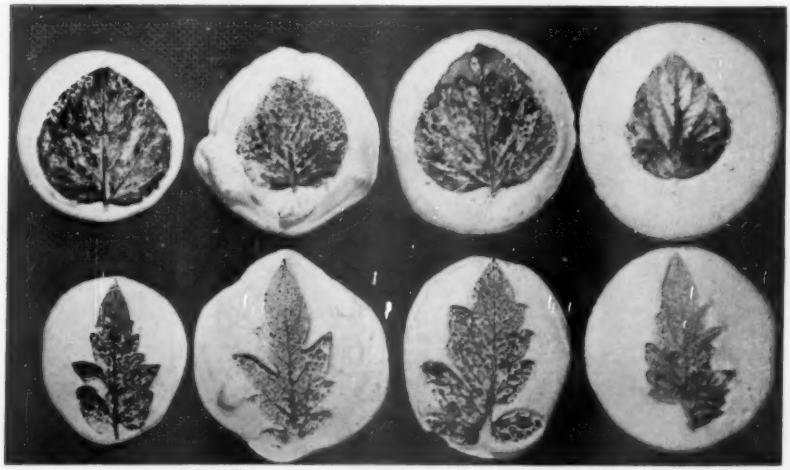


FIG. 28—Plaque method of recording spray patterns and retention on leaves. Photograph shows retention of copper sprays on potato and tomato leaves
(See p. 117)

DWARF SHRUBS

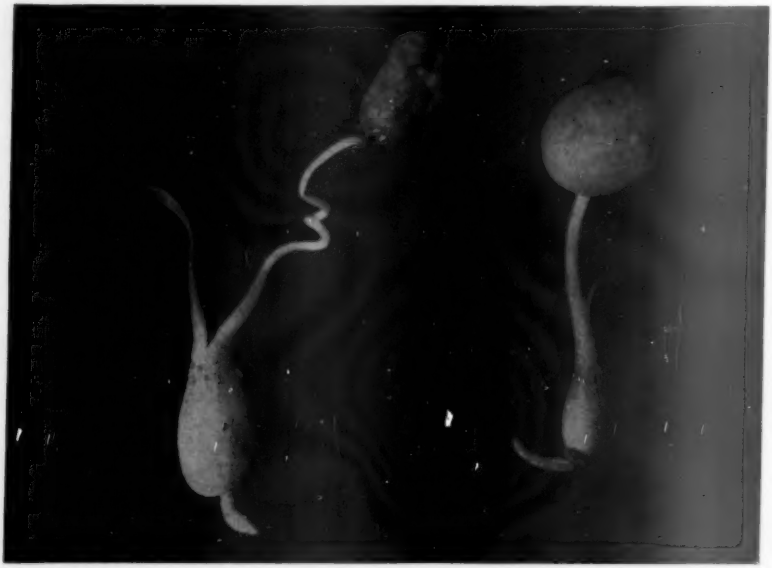
FIG. 29—*Potentilla fruticosa* var. 'Katherine Dykes' (See p. 124)

Photo, R. A. Malby

THE SANDER MEDAL, 1954

FIG. 30—*Kalanchoe* 'Vivid,' shown by Shenley Hospital, St. Albans, on May 25, 1954. This plant also received an Award of Merit (See February JOURNAL, p. 55)

FIG. 31—*Adiantum venustum* growing in the garden of MR. W. P. KING
(See p. 136)



Photo, R. P. Scase

FIG. 32—Seedlings from parthenogenetic seed of *Amaryllis belladonna*
(See p. 128)

the years go by, but I retain vividly in my mind two or three plants, often just one, which I have perhaps seen thriving better than ever before, or possibly a plant seen for the first time. Such a plant was *H. involucrata hortensis* growing at Highdown, COLONEL STERN'S home. He gave me this grand little plant with its conspicuous double flowers. Hitherto I had only grown the type plant, a compact species 18 inches high, with terminal heads of flower, blue or lilac surrounded by white florets, encircled by conspicuous leafy bracts.

The tiniest "Holly," *Ilex crenata mariesii*, which increases at the rate of about a quarter of an inch per year, is a plant of character for a conspicuous front position. It is a stiff habited, stunted little plant with tiny nearly round leaves.

There are a great many shrubby honeysuckles in cultivation, many of which are unlikely to find their way beyond the botanical collections, though quite a few have a subtle attraction. Among the few which might be considered under the title of our subject, none is more worthy than *Lonicera pyrenaica* which forms a globular, compact, glabrous bush 2½ feet high. In June the comparatively large pink-and-cream flowers appear in pairs in the terminal leaf axils. Many honeysuckles may be very easily propagated from cuttings, but this one is difficult, hence its rarity.

Most of the "Rest-harrows" are herbaceous or sub-shrubby, but certainly one, *Ononis fruticosa*, is a really good dwarf shrub attaining about 2½ feet. It has a pleasing irregular habit of growth, trifoliate leaves with narrow leaflets and ¾-inch long, bright cherry-pink, leguminous flowers carried in short, terminal panicles.

Most of the "Mock Oranges" are tall-growing shrubs, but fortunately there is at least one dwarf species, *Philadelphus microphyllus*, a dense, deciduous, rounded shrub about 3 feet high with slender branches and tiny leaves. In June this lovely shrub bears inch-wide, very fragrant flowers. This species hybridized by LEMOINE with *P. coronarius* has given our gardens a new race of most beautiful free-flowering shrubs grouped under the name *P. lemoinei*. Of these hybrids 'Manteau d'hermine' is an excellent compact low shrub with fragrant double cream flowers.

The genus *Sorbus* comprises the Rowans, or Mountain Ashes, with pinnate leaves and the Whitebeams with usually broad simple leaves, as well as a related group, *Micromeles*. Most of the genus are trees but there are several shrubs of moderate to tall size and at least two species which fall within the scope of dwarf shrubs. One of these, *Sorbus reducta*, is a most amusing small plant of the Mountain Ash tribe. At only a foot high it will flower and carry pink-and-white Pernettya-like berries.

Having since a child been familiar with the name *Veronica* to include all the "Speedwells" it is difficult to refer to the shrubby species as *Hebe*. There is a host of dwarf evergreen shrubby veronicas, many of which are very attractive. To name three I would mention *V. albicans*, a dense, globular bush to 2 feet high with beautiful glaucous foliage and

short, dense spikes of white flowers. *V. macrantha*, a compact erect evergreen 1½ foot high, is noteworthy as having the largest white flowers of the shrub veronicas. A fascinating hybrid *Veronica* flowering all the summer and late into the autumn is 'Bowles' Hybrid,' a plant about 2 feet high with a succession of mauve-lilac spikes.

There is a vast range of beautiful dwarf shrubs which might equally well have been included in these notes, but suffice for them to end with a reference to *Ulex gallii*, a glorious native neglected by gardeners. What is more beautiful than acres of this plant, a sheet of gold, growing in company with *Erica cinerea* and *E. tetralix* on the hills which slope towards the mouth of Salcombe Harbour and the mountain slopes of central Wales.

GERMINATION OF PARTHENOGENETIC SEED IN AMARYLLIDS

Major A. Pam, O.B.E., M.A., F.L.S., V.M.H.

IN the late autumn of 1953 I picked a large bunch of *Nerine bowdenii* and filled two vases for decoration in the house. The flowers were not open, but within twenty-four hours most of them were in full flower. They remained on my table for nearly three weeks, and I was just going to throw them away when I noticed seed formation in a number of ovaries. I therefore put the vases in a room rarely used, and went to see them from time to time. Some of the seeds swelled and increased in size rapidly—others remained very small and transparent. Just before Christmas I found that the seeds were ripe, so I placed them in a large cup and left them with a view to sowing after the turn of the year.

Somehow I forgot to do this, and I did not see the seeds again for two or three months—all this time they had been in the dry cup in a dry room. By then nearly all the seeds had germinated (Fig. 32); there was a stoloniferous growth connecting the seed with the new plant, and the first leaf was very evident. I gave some seeds to DR. H. R. FLETCHER, then the Director of the Wisley Gardens of the R.H.S., and some to the Curator (MR. NEWELL) of the John Innes Horticultural Institution at Bayfordbury, Hertford.

Before his death I discussed this formation of parthenogenetical seed and its subsequent germination with my old friend, E. A. BOWLES. He told me that he had observed this in certain Amaryllids, but when I asked whether he had ever recorded it, he said that he had not. (Incidentally, one wonders how many important observations in botany and horticulture have been lost with the death of MR. BOWLES. He had a wonderful store of knowledge and of experience gathered in the sixty years or more of his devotion to plants. He was so modest that he

believed that what he knew was common knowledge, and had therefore not troubled to set it out in the form of an article which would record the facts for future reference.)

On the other hand, I have questioned a number of botanists, and not one was aware of the fact that this parthenogenetic seed was formed and would germinate. After enquiries which I had made I find that there are a few references in botanical literature—these I have mentioned at the end of this article. COLONEL F. C. STERN tells me that he has been aware for some time of the formation of this seed—but he has not recorded his observations.

My friend, MR. L. S. HANNIBAL, of Fair Oaks, California, who is a grower of large numbers of amaryllids, has written me a note on this subject, which appears on page 130. He lives in a favoured climate where all these plants can be grown out of doors; he can therefore observe the conditions on a much larger scale than can be done in this country, and I am grateful to him for his help.

I had written this article up to this point, when a few botanists asked whether I had made any control experiments to make sure that the pollen from the anthers of my flowers had not fallen on the stigma and fertilized the flowers. It was suggested to me that I ought to make experiments to justify the assumption that the seed was really parthenogenetic. So last year I picked six of the first flowers of *Nerine bowdenii* to form, and brought them indoors. I opened the flowers sufficiently to emasculate them, and then left them in the vase to open. When the stigma was ready, I picked a few flowers of other amaryllids, such as *Sternbergia lutea*, and used their pollen on half of the stigma, leaving the other half without any irritant. All I need say is that every flower formed seed, which is, I maintain, definite proof of the parthenogenetic formation of seed on *Nerine bowdenii*.

I think that I ought to mention here that the carrying of pollen by an insect did occur to me as a possibility, but there were no insects in the room in which the flowers were placed, so that this does not arise as a possible cause of the parthenogenesis.

DR. GORDON HASKELL of the John Innes Horticultural Institute was most helpful to me in discussions about parthenogenetical formation of seed; he published an article which is mentioned in the Bibliography at the end of this note.

Since then the seed I sowed in a pan about April or May, 1954, has made good progress. The seedlings have made a number of leaves, and the bulbs are evidently growing. I shall leave them in the pan until next spring, when I intend to plant them out and let them look after themselves.

I feel sure that a great deal of interesting cross breeding in the group of *Amaryllidaceae* is possible. MR. HANNIBAL is doing some very serious investigations with *Amaryllis belladonna*, *Brunsvigia* (spp.) and various crosses as a basis, and he will no doubt have some interesting results to announce before long.

As it seems probable that generic hybrids are due to a close relationship, much closer than the present taxonomic position would ordinarily justify, it seems to me to be probable that before long there will be a much closer approach between *Amaryllis belladonna* and some species of the genus *Brunsvigia*, and that to this group a number of species now included in the genus *Crinum* will necessarily be joined. I believe that generic interbreeding can rarely be botanically justified and that, where this is known to occur, it is probably due to a mistaken taxonomic determination. I know that this question is a long way off from the basis of this article, which is the parthenogenetic formation of viable seed; but it opens a door to a great many very different and difficult problems.

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UNUSUAL SEEDING HABITS OF *AMARYLLIS BELLADONNA*

L. S. Hannibal

THE writer's first observation of parthenogenetic seed setting on *Amaryllis belladonna* occurred in 1942 when he wished to repeat the *Crinodonna* cross. This bigeneric hybrid, which is known as either *C. corsii* or *Amarcrinum howardii*, is effected by placing *Crinum moorei* pollen on *Amaryllis belladonna*. It is a simple procedure, but to ensure that self-pollination of the out of season *A. belladonna* would not occur, all of the blossoms were opened a day before maturing and the unopened anthers were removed. The weather was warm, which is typical of inland Californian summers, and a heavy set of seed resulted with the *Crinum* pollen. When the pods ripened the three described seed types were found:

(*a*) Six or seven large pulpy seeds 10 to 15 mm. in diameter, and distinctly opalescent green in colour due to a chlorophyll integument. These seeds had already sprouted in the pod, which often happens with *Crinum* seed. All grew to maturity and were definitely *Crinodonna* seedlings.

(*b*) Some forty-five pulpy seeds 8 to 12 mm. in diameter, but prominently pigmented a coral red. These seeds germinated more slowly and eventually flowered, only to be identical to the maternal plant.

(*c*) Some 180 small seeds, 2 to 6 mm. in size, pigmented a coral red, but lacking in the pulpy flesh. These seeds germinated, but grew exceptionally slowly. Two or three plants have been kept, but after twelve years still throw dwarfed foliage less than ¼ inch wide.

The source of this rose pigmented seed (types (*b*) and (*c*)) was eventually recognized as parthenogenetic. Numerous breeding results made since have indicated that this is a common occurrence, and is more prevalent in some clones than in others. The condition is not limited to *Amaryllis belladonna*, but appears in *Nerine*, *Brunsvigia*, *Habranthus*, *Zephyranthes*, and other members of the Amaryllis family. Evidence indicates that the smaller, or stunted seeds, have a deficiency in chromosomes and are useless, but the normal-sized seeds duplicate the maternal plant. Technically there are two types of parthenogenetic seedlings possible, one of which is a bud sport of maternal tissue which surrounds the germ cell, and is typical of citrus seedlings; the other is a spontaneous growth of the female germ cell. This latter condition is that which occurs in the above *Amaryllidaceae*, but with these plants is likely to be more prevalent than the natural function. This is based upon the condition that many plants rarely accept their own pollen, but will respond to that of a related seedling. Then, where wide separation exists, as between *Crinum* and *Amaryllis*, incompatibilities also occur. Thus in either instance, if normal fertilization is hindered, spontaneous germ cell development takes place. As a consequence breeding with these plants is anything but dependable.

This parthenogenetic behaviour has historical aspects. If DEAN WILLIAM HERBERT, the patron saint of *Amaryllis* growers, had used *Iridaceae* or some other plant family in attempting to explain the behaviour of hybrids back in 1835, it is probable that he could have left a discovery as definite as that of MENDEL, but the *Amaryllidaceae* were too complex for that early age. As a consequence his early writings are of interest, but have contributed little to practical plant breeding.

PLANTS AND PROBLEMS—XIV

OCCURRENCE OF WEEDS

Question. I have an excellent gardener who commandeers any scrap of waste material he can find for his compost heaps. As a result each year there is an enormous amount of compost made from grass mowings, newspapers, vegetable waste from the house, manure from our poultry and any amount of weeds of all kinds. Now this is all very well but during the last year or two I have found that in the rose beds for instance (which I look after myself) I have had to deal with the most awful infestation of weeds like the annual nettle, groundsel and chickweed. Because of my troubles I have been

forced to doubt my gardener's wisdom in composting everything and anything. Can you tell me please if the compost is the source of the infestation by harbouring seeds of the weeds now troubling us?

Answer. It is generally thought that if compost has been made correctly by stacking it in layers with poultry manure intermixed, by giving an occasional sprinkling of lime and by turning the heap at least once, then, in decomposing, the heap should have generated heat, and weeds—and seeds of weeds—should have been killed. Consequently it may be assumed that applications of compost should have had no direct bearing on the occurrence of the weeds among your roses. However, the fact remains that weeds frequently do appear after heavy dressings of compost and the reasons are two-fold. Firstly, even after exercising all possible care, most compost heaps do not generate enough heat to kill seeds of weeds and a re-infestation of unwanted plants is always a possibility. Secondly, and this is the important point, the appearance of some weeds after ground has been manured is brought about by the *increased fertility of the soil*, indeed the case in question is a splendid example of this, for all the weeds mentioned are denizens of soils in good heart.

TREATMENT OF A JAPANESE QUINCE

Question. In our garden we have an old specimen of "Japonica" against the house which, I regret, has been neglected and has now grown straggly and does not flower like it did years ago. Despite its condition I am loath to destroy the plant and would appreciate some cultural advice for its treatment.

Answer. We presume you refer to the Japanese Quince, a shrub known botanically as *Chaenomeles speciosa*. When such a plant gets out of hand all young growth should be spur-pruned quite hard along the same lines as one would treat an apple. In addition a little judicious thinning or shortening of old branches may be done where growth is too thick. Also, it would be well to feed your plant in the early spring with a dressing of "National Growmore" at 2 oz. per sq. yard and follow this by a generous application of compost, or preferably, animal manure.

RED CURRANTS AND GOOSEBERRIES

Question. I find that I am constantly losing red currant and gooseberry bushes through some form of die-back. This seems to start in one branch, eventually spreading to others and sometimes to the main stem so that the whole bush dies. Apart from the obvious cutting out of all diseased wood is there any surer way of overcoming the trouble? Quite often the dead branches remain unnoticed until they snap off quite suddenly during pruning. My soil is rather poor and sandy.

Answer. The dying of branches and even whole bushes can reach serious proportions where red currants and gooseberries are grown

on hungry sandy soils. The trouble would appear to be linked directly with the general lack of vigour associated with such soils, no amount of feeding and mulching having any effect. In such cases it is worth growing the bushes on the "stool" method as for black currants. By not having the bushes on a "leg" the chances of losing a whole bush are greatly reduced. More than sufficient young growth should be produced annually from the base to replace any others that may have died out. Growths surplus to requirements are removed from ground level.

The all-important point is to prepare the cuttings correctly when propagating. Normally red currant and gooseberry cuttings have all buds removed except the top three or four before they are inserted, but for growing on the stool method all buds should be left intact as for black currant cuttings.

WALL-TRAINED PEACHES—FROST PROTECTION

Question. I have some wall-trained peach trees. For the past two or three years I have draped a double thickness of fish-netting over them during the flowering period as a protection against frost. Ever since doing this, however, I have had a greatly reduced crop and I am convinced that this must be due in some way to my covering the trees, as neighbours who have taken no such precautions have had reasonable numbers of peaches.

Answer. It is assumed from your enquiry that the fish-netting remained over the trees day and night during the flowering period. This being the case the netting would deter bees and other pollinating insects from reaching the blossoms, which would therefore remain unpollinated and infertile. A certain amount of protection from frost can be gained by using fish-netting, hessian or similar material, but it is most important to roll this back during the day so that the bees can easily reach the flowers. The same applies to other wall-trained fruits such as nectarines, apricots and gages. The only time that the removal of a protective "curtain" should be delayed is immediately after a severe frost, when it should be left in position for an hour or two to avoid too rapid a thaw. By doing this any damage from frost penetration will at least be reduced.

CABBAGE ROOT FLY

Question. My garden has always been subject to attack by cabbage root fly. Last year the pest was particularly severe and in spite of dressings of calomel dust at planting time and afterwards, attacks continued. I believe there are now more effective insecticides on the market. Can you give me details of these?

Answer. We recommend the use of gamma B.H.C. preparations for the the control of cabbage root fly, *Erioischia brassicae*. After transplanting, a low-percentage dust of gamma B.H.C. should be applied to the base of the plants using about ¾ lb. of the dust per 100 plants,

or if preferred plants may be watered with gamma B.H.C. wettable powder diluted according to makers' instructions.

When Aldrin becomes generally available it may be used as an alternative to gamma B.H.C. The low-percentage dusts and wettable powders are applied as above. Alternatively the roots and lower parts of the stem may be dipped in a solution of Aldrin (strength 1 part Aldrin in 200 parts water) before setting out.

SUCKERS ON ALDER AND APPLE

Question. I am enclosing these alder twigs from a tree near my orchard. Last year, my apple trees were attacked by apple sucker and I am sure the infestation originated from the alder tree which is covered with white woolly insects every year.

Answer. As you suspect, the alder tree is infested with a sucker but the species *Psylla alni* is quite distinct from the one which attacks apple. The nymphs of the alder sucker are enveloped in a mesh of white woolly threads giving the "woolly" appearance you have observed. The alder sucker is not usually regarded as a pest unless heavy infestations occur on specimen trees thus retarding the growth of new shoots.

The apple sucker, *Psylla mali*, may be controlled by spraying with Tar Oil in December or January, or applying D.N.C. in early March. Alternatively, B.H.C. may be used at the green cluster stage. All these substances should be diluted according to makers' instructions.

APPLE SOOTY BLOTCH

Question. Last season many of my apples had a black smudgy discoloration which rubbed off easily but I should like to know the reason for it.

Answer. Your apples were affected by the sooty blotch fungus *Gloeodes pomigena* which makes sooty smudges each about ¼ inch across on the skin of the fruit and as they run together the discoloration may cover quite a large part of the surface. This disease is usually seen in wet seasons such as we experienced last year and it is usually found on branches which are shaded or are too crowded. On trees which are sprayed for scab disease sooty blotch is not so likely to occur. It is only troublesome in wet summers and no special treatment is necessary apart from keeping branches from becoming overcrowded.

PELARGONIUM VIRUS

Question. I have been told that my pelargonium plants have a virus. Will you please describe this disease and tell me how to cure it?

Answer. The virus disease of pelargonium plants is often called "leaf curl" but the first signs are very small light yellowish spots which develop into star-shaped blotches. At these spots the leaf tissues are injured so that the young leaves become crinkled and

puckered. In well cultivated plants as the season progresses the symptoms seem to disappear because the young leaves develop normally and the affected ones drop off in time. It should be remembered, however, that the plant is still infected and next season's cuttings will show the symptoms again. If plants are checked in growth the symptoms may reappear even on mature plants. There is no cure for this virus and the only way to keep a clean stock is to destroy the young plants which show signs of virus infection and to keep down insects, especially aphids, which spread the virus in the greenhouse.

NOTES FROM FELLOWS

Dahlia imperialis

DAHLIA species are rarely seen in gardens today and of the ten or so recorded it would be difficult to find any except perhaps in a botanical collection. It is a debatable point whether or not they are worth growing, but like most true plant species they all have poise and a pleasing charm of their own, not found in the multitude of types and hybrids seen in gardens. *Dahlia imperialis* has much to recommend it.

It has never been recorded exactly where *Dahlia imperialis* comes from other than the "high parts of Mexico," but it has been in cultivation for a very long time, indeed it received a **F.C.C.** when exhibited in 1869.

The specimen illustrated (Fig. 20) flowered in the cool corridor at Bayfordbury in November. It was 11 feet high and bore a panicle some 30 inches long with twenty-two flowers each measuring some 5 inches across. As will be seen, many of these flowers were open at the same time and they made a really delightful picture.

The flowers of *Dahlia imperialis* are Pastel Mauve in colour (H.C.C. 433/3), almost an off-white of pearly texture with a deep maroon base of stellate pattern to each of the eight petals. They do not open flat as does the ordinary dahlia, but when fully developed are bell-shaped and posed hanging downwards at an acute angle to the pedicels. Our plant produced one panicle of flowers on a stout stem sparsely clothed with three-pinnate leaves, the largest quite 2 feet long.

The merits of *Dahlia imperialis* are its large scape of delicate coloured flowers which open together, all beautifully spaced and poised on the stem. Its disadvantages are its great height and lateness of flowering. It is useless outdoors. However, this drawback was at one time overcome by grafting on to dwarf garden forms, which, we are told, flowered with remarkable freedom. To the connoisseur this might well be worth repeating.

J. NEWELL, *Curator*

John Innes Horticultural Institution.

A hardy Maidenhair Fern

The true gardener doubtless is no believer in the myth of "green fingers," but occasionally Nature varies her usual practice for the benefit of some fortunate, though undeserving, tyro. I am the beneficiary of one such gracious favour.

Your readers might be interested to see the photograph (Fig. 31) of a plant of Maidenhair Fern (*Adiantum venustum*) in my garden at Watford, which has ignored my neglect and misfeasance for some twenty-five years. It now measures 7 feet by 6 feet, notwithstanding inroads on its perimeter for admiring friends.

During the past twenty-five years it has been baked, frozen, buried in snow and raked by tempest. It grows in a soil with the drainage of a sieve and, at times, the aridity of the Sahara. Two large trees which gave it some shade had to be removed a few years ago and for the greater part of the day since it has had to put up with the full strength of any sunshine available.

It is never watered, top-dressed or protected in any way, but it has never shown any yearning for the cool twilight of the dripping grotto said to be essential for its survival.

Two or three years ago the Director of Wisley accepted a portion for the Gardens. When I saw it on my last visit I found that he was prudently keeping it in a pan under the stage in the Alpine House. May I bid him to be of stout heart and to plant it out!

W. P. KING.

The Director of the Gardens writes: The *Adiantum* which MR. KING presented to the Gardens in 1950 has been elevated from beneath the staging of the Alpine House on to the staging. The plant in the Alpine House is now big enough to divide and a portion of it will be planted outside and its behaviour watched with interest.

WISLEY TRIALS, 1954

DAHLIA

One hundred and eighty-two stocks of dahlia were grown at Wisley in 1954. Sixty-six of these stocks were grown for the first time having been selected during 1953 for trial at Wisley by the Joint Dahlia Committee of The Royal Horticultural Society and the National Dahlia Society.

The trial was inspected by the Joint Dahlia Committee on August 19 and September 15, 1954 and on its recommendation The Royal Horticultural Society and the National Dahlia Society have made jointly the following awards to dahlias as varieties for garden decoration after trial at Wisley. The number in brackets after the description of the variety was that under which it was grown in the trial.

Class III. Anemone-Flowered

COMET. (Raised, introduced and sent by Messrs. N. J. van Oosten, Laan v. N.O. Indie 427a, Den Haag, Holland.) **H.C.** September 15, 1954.—Plant 48 inches high, compact, erect, bearing flower stems 16 inches long. Flowers 4¼ inches diameter, ray florets a bright velvety red near Currant Red (H.C.C. 82) with very dark red shading, disc florets darker red than ray florets. [138]

Class VIA. Giant-Flowered Decorative

VISCOUNT BLEDISLOE. (Raised by Mr. H. Johnston, introduced and sent by J. Riding Esq., 36 Alderman Hill, Hockley, Essex.) **H.C.** September 15, 1954.—Plant 66 inches high, compact, erect, bearing flower stems 20 inches long. Flowers 11 inches diameter, a velvety red between Signal Red (H.C.C. 719) and Orient Red (H.C.C. 819). [4]

Class VIC. Medium-Flowered Decorative

RUNWICK. (Raised, introduced and sent by Mr. Owen Parratt, Boundstone Nursery, Farnham, Surrey.) **A.M.** September 15, 1954.—Described R.H.S. JOURNAL **79,** p. 144 (**H.C.** 1953). [21]

HOUSE OF ORANGE. (Raised, introduced and sent by Messrs. de Ruyter Bros., Oegstgeest, Holland.) **H.C.** September 15, 1954.—Plant 42 inches high, compact, erect, bearing flower stems 12 inches long. Flowers 6½ inches diameter, outer florets Straw Yellow (H.C.C. 604) overlaid Nasturtium Orange (H.C.C. 610/1), inner florets Straw Yellow (H.C.C. 604) overlaid Nasturtium Orange (H.C.C. 610). [26]

LILIAN COMPTON. (Raised, introduced and sent by Messrs. Brown & Such Ltd., The Royal Berkshire Nurseries, Maidenhead, Berkshire.) **H.C.** September 15, 1954.—Plant 57 inches high, compact and erect, bearing flower stems 18 inches long. Flowers 7½ inches diameter, outer florets Straw Yellow (H.C.C. 604) flushed Orange (H.C.C. 12/2), inner florets Straw Yellow (H.C.C. 604) heavily flushed Orange (H.C.C. 12/2). [30]

Class VID. Small-Flowered Decorative

NEWBY. (Raised and sent by Mr. J. F. Barwise, Towneley Nurseries, Towneley, Burnley, Lancs., and introduced by Messrs. Wm. Westwell & Sons, The Nurseries, Leigh, Lancs.) **A.M.** August 19, 1954.—Described R.H.S. JOURNAL **79,** p. 145 (**H.C.** 1953). [37]

DIANE EGBY. (Raised, introduced and sent by Messrs. Brown & Such Ltd.) **H.C.** September 15, 1954.—Plant 54 inches high, compact, bushy, erect, bearing flower stems 18 inches long. Flowers 4½ inches diameter, outer florets white, inner florets cream. [33]

SANDRA STRANGE. (Raised by J. Riding Esq., and sent by J. Strange Esq., Greensward House, Greensward Lane, Hockley, Essex.) **H.C.** August 19, 1954.—Plant 60 inches high, compact, erect, bearing flower stems 20 inches long. Flowers 4 inches diameter, Mimosa Yellow (H.C.C. 602/1) with outer half of floret splashed with Scarlet (H.C.C. 19/1). [174]

TOWNELEY CLASS. (Raised and sent by Mr. J. F. Barwise, introduced by Messrs. Wm. Westwell & Sons.) **H.C.** September 15, 1954.—Plant 63 inches high, compact, erect, bearing flower stems 15 inches long. Flowers 5¼ inches diameter, white flushed Rose Purple (H.C.C. 633). [56]

Class IXB. Large-Flowered Cactus

SARAH SIMCOCK. (Raised, introduced and sent by J. H. Ferry Esq., Cotswold, Pantmawr Rd., Whitchurch, Cardiff.) **H.C.** August 19, 1954.—

Plant 60 inches high, compact, erect, bearing flower stems 15 inches long. Flowers 9 inches diameter, outer florets Blood Red (H.C.C. 820) flushed Solferino Purple (H.C.C. 26/1), inner florets Blood Red (H.C.C. 820). [81]

Class IXC. Medium-Flowered Cactus

BACCHUS (MAARSE). (Raised, introduced and sent by Messrs. K. Maarse Dz., Jr., Uiterweg 32, Aalsmeer, Holland.) **A.M.** August 19, 1954.—Described R.H.S. JOURNAL **79,** p. 145 (**H.C.** 1953). [106]

DOGE. (Raised, introduced and sent by Messrs. D. Bruidegom, Baarn, Holland.) **H.C.** August 19, 1954.—Plant 54 inches high, compact, erect, bearing flower stems 20 inches long. Flowers 7¼ inches diameter, Cyclamen Purple (H.C.C. between 30/1 and 30). [107]

Class XI. Dwarf Bedding

JANET MINER. (Raised, introduced and sent by Messrs. Alex Lister & Son Ltd., Barone Rd., Rothesay, Bute.) **H.C.** August 19, 1954.—Plant 33 inches high, compact, bushy, erect, bearing flower stems 6 inches long. Flowers 4 inches diameter, at base of floret Mimosa Yellow (H.C.C. 602) changing through salmon-buff to Phlox Pink (H.C.C. between 625/1 and 625) at margins. [167]

ROSE HALL. (Raised, introduced and sent by Messrs. Alex Lister & Son Ltd.) **H.C.** September 15, 1954.—Plant 33 inches high, compact, bushy, erect, bearing flower stems 10 inches long. Flowers 4 inches diameter, near Fuchsine Pink (H.C.C. 627/1). [168]

ROTHESAY CASTLE. (Raised, introduced and sent by Messrs. Alex Lister & Son Ltd.) **H.C.** September 15, 1954.—Plant 30 inches high, compact, bushy, erect, bearing flower stems 8 inches long. Flowers 3¾ inches diameter, outer florets Rhodamine Pink (H.C.C. 527/1), inner florets cream flushed Rhodamine Pink (H.C.C. 527/1) at base yellow. [170]

ROTHESAY YELLOW. (Raised, introduced and sent by Messrs. Alex Lister & Son Ltd.) **H.C.** September 15, 1954.—Plant 30 inches high, compact, bushy, erect, bearing flower stems 8 inches long. Flowers 3¾ inches diameter, a very clear bright shade of yellow near Primrose Yellow (H.C.C. 601). [171]

EARLY-FLOWERING CHRYSANTHEMUM

One hundred and twenty-eight stocks of chrysanthemum were grown at Wisley in 1954. Of these, twenty-six were grown for the first time having been selected during 1953 for trial at Wisley by the Joint Early-Flowering Chrysanthemum Committee of The Royal Horticultural Society and the National Chrysanthemum Committee.

Cuttings were rooted during February and March and the trial was planted out on May 4, 1953. The plants were stopped once where necessary and the pompon and spray varieties were allowed to flower naturally and the other varieties were disbudded to allow one flower to develop on each main growth with an average of eight to ten flowers per plant.

Control of the chrysanthemum eelworm (*Aphelencoides ritzema-bosi*) was obtained by the use of a Parathion spray at 0·01 per cent. active ingredient. The spray was applied when the plants were in cold frames and again after planting out.

The trial was inspected by the Joint Chrysanthemum Committee of The Royal Horticultural Society and the National Chrysanthemum Society on

August 9 and 20 and September 9 and 27, 1954, and on its recommendation The Royal Horticultural Society and the National Chrysanthemum Society have made jointly the following awards to chrysanthemums after trial at Wisley.

The varieties are arranged in the report according to the classification of the National Chrysanthemum Society. The number in brackets after the description of the variety was that under which it was grown in the trial.

Section XXI.—Outdoor Varieties, Reflexed

(*a*) *Large Flowered*

Yellow

GOLDEN AGE. (Raised by Mr. H. Shoesmith, V.M.H., introduced and sent by Messrs. H. Shoesmith Ltd., Mayford Nurseries, Moor Lane, Westfield, Woking, Surrey.) **A.M.** September 27, 1954, as a disbudded variety for garden decoration.—Plant 42 inches high, compact, bushy, erect, bearing flower stems 24 inches long. Flowers 5¼ inches diameter, Aureolin (H.C.C. 3), reverse slightly paler yellow. [80]

YELLOW TRIUMPH. (Raised, introduced and sent by Messrs. J. & T. Johnson, The Nurseries, Tibshelf, Derbyshire.) **A.M.** September 9, 1954, as a disbudded variety for garden decoration.—Plant 45 inches high, compact, bushy, erect, bearing flower stems 24 inches long. Flowers 6½ inches diameter, outer florets Aureolin (H.C.C. 3), inner florets Lemon Yellow (H.C.C. 4). [72]

Light Bronze

EAMONN ANDREWS. (Raised, introduced and sent by Messrs. H. Woolman Ltd., Sandy Hill Nurseries, Shirley, Birmingham.) **A.M.** September 27, 1954, as a disbudded variety for garden decoration.—Plant 54 inches high, compact, bushy, erect, flower stems 36 inches long. Flowers 5¾ inches diameter, Lemon Yellow (H.C.C. 4/1) slightly flushed Tangerine Orange (H.C.C. 9/1). [88]

Bronze

JACKSON'S FOXHUNTER. (Raised, introduced and sent by Mr. W. B. Jackson, Brown Heath Nursery, Waverton, Cheshire.) **A.M.** September 27, 1954, as a disbudded variety for garden decoration.—Plant 54 inches high, bushy, compact and erect, bearing flower stems 30 inches long. Flowers 5¼ inches diameter, Yellow Ochre (H.C.C. 07) overlaid with light chestnut brown. [99]

Red

VELVET GOWN. (Raised, introduced and sent by Messrs. J. & T. Johnson.) **A.M.** September 9, 1954, as a disbudded variety for garden decoration.—Plant 48 inches high, bushy, compact and erect, bearing flower stems 28 inches long. Flowers 6 inches diameter, a deep rich velvety bright red near Currant Red (H.C.C. 821). [65]

Pink

NEW PRINCESS. (Raised by Mr. H. Shoesmith, V.M.H., introduced and sent by Messrs. Greenyer Bros. Ltd., Broadwater Green Nursery, Worthing, Sussex.) **F.C.C.** September 27, 1954, as a disbudded variety for garden decoration. Described R.H.S. JOURNAL **78**, p. 68 (**A.M.** 1952). [62]

SHEILA ROSE. (Raised, introduced and sent by Mr. W. B. Jackson.) **F.C.C.** September 9, 1954, as a disbudded variety for garden decoration. Described R.H.S. JOURNAL **79**, p. 143 (**A.M.** 1953). [53]

CROMFORD. (Raised, introduced and sent by Messrs. J. & T. Johnson.) **A.M.** September 27, 1954, as a disbudded variety for garden decoration.—Plant 48 inches high, compact, bushy and erect, bearing flower stems 28 inches long. Flowers 5 inches diameter, a shade of rose near Magenta Rose (H.C.C. 027) fading towards tips, reverse cream suffused magenta. [54]

WELLINGTON PINK. (Raised by Mr. H. Shoesmith, V.M.H., introduced and sent by Mr. Frank Rowe, Ryeland Nurseries, Wellington, Somerset.) **A.M.** September 27, 1954, as a disbudded variety for garden decoration.—Plant 60 inches high, compact, bushy and erect, bearing flower stems 36 inches long. Flowers 5½ inches diameter, Magenta (H.C.C. between 27/3 and 27/2), reverse silvery mauve. [48]

Purple

ATHOL. (Raised by Mr. H. Shoesmith, V.M.H., introduced and sent by Messrs. T. J. French Ltd., St. George's Nurseries, Bickley Park Road, Bromley, Kent.) **A.M.** September 9, 1954, as a disbudded variety for garden decoration. Plant 45 inches high, compact, bushy and erect, bearing flower stems 26 inches long. Flowers 5¾ inches diameter, a dull shade of magenta near Magenta (H.C.C. 27), reverse silvery pink. [64]

(b) Medium-Flowered

White

COTSWOLD GEM. (Raised by Mr. W. Avery, introduced and sent by Messrs. Greenyer Bros. Ltd.) **F.C.C.** August 20, 1954, as a spray variety for garden decoration.—Described R.H.S. JOURNAL **75**, p. 127 (**A.M.** 1949). [20]

Yellow

ORANGE SWEETHEART. (Raised, introduced and sent by Messrs. Colham Green Nurseries Ltd., Chapel Lane, Hillingdon, Middlesex.) **F.C.C.** August 20, 1954, as a disbudded variety for garden decoration.—Plant 36 inches high, compact, bushy and erect, bearing flower stems 26 inches long. Flowers 4¾ inches diameter, near Tangerine (H.C.C. 9/1), reverse pale golden yellow (**A.M.** 1950). [118]

SHINING GOLD. (Raised, introduced and sent by Mr. W. B. Jackson.) **F.C.C.** September 27, 1954, as a disbudded variety for garden decoration.—Described R.H.S. JOURNAL **78**, p. 68 (**A.M.** 1952). [77]

RADAR IMPROVED. (Raised, introduced and sent by Messrs. Colham Green Nurseries Ltd.) **A.M.** August 20, 1954, as a disbudded variety for garden decoration.—Plant 48 inches tall, compact, bushy and erect, bearing flower stems 24 inches long. Flowers 4½ inches diameter, outer florets near Indian Yellow (H.C.C. between 6/1 and 6), inner florets same colour as outer slightly touched with bronze. [75]

Light Bronze

COVENT GARDEN. (Raised, introduced and sent by Messrs. H. Woolman Ltd.) **F.C.C.** September 9, 1954, as a disbudded variety for garden decoration.—Described R.H.S. JOURNAL **79**, p. 143 (**A.M.** 1953). [85]

Red

RED TIBSHELF IDEAL. (Raised, introduced and sent by Messrs. J. & T. Johnson.) **F.C.C.** August 20, 1954, as a disbudded variety for garden decoration.—Described R.H.S. JOURNAL **79**, p. 144 (**A.M.** 1953). [87]

DEVONIAN. (Raised, introduced and sent by Messrs. H. Woolman Ltd.) **A.M.** September 9, 1954, as a disbudded variety for garden decoration.—Plant 42 inches high, compact, bearing flower stems 24 inches long. Flowers 5 inches diameter, a rich crimson near Jasper Red (H.C.C. 018) overlaid Chrysanthemum Crimson (H.C.C. 824/1). [110]

RED ARNHEM. (Raised, introduced and sent by Mr. Frank Rowe.) **A.M.** August 20, 1954, as a disbudded variety for garden decoration.—Plant 4 feet high, compact, bushy and erect, bearing flower stems 24 inches long. Flowers 5½ inches diameter, chestnut bronze heavily flushed crimson. [108]

Salmon

PAMELA JAMES. (Raised by Mr. H. Shoesmith, V.M.H., introduced and sent by Messrs. H. Shoesmith Ltd.) **F.C.C.** September 27, 1954, as a disbudded variety for garden decoration.—Described R.H.S. JOURNAL **78**, p. 68 (**A.M.** 1952). [52]

(c) Small-Flowered

Yellow

GOLDEN DOROTHY VERNON. (Raised and introduced by Messrs. Colham Green Nurseries Ltd. and sent by Mr. G. R. Bacon, Heathfield Nurseries, Eccleshill, Bradford, Yorks.) **A.M.** August 20, 1954, as a disbudded variety for garden decoration.—Plant 36 inches high, compact, bushy and erect, bearing flower stems 18 inches long. Flowers 3½ inches diameter, a clear bright shade of yellow near Lemon Yellow (H.C.C. 4). [51]

Section XXIV.—Outdoor varieties, Pompon

(a) Tall

Yellow

POPPET. (Raised by Mr. H. Shoesmith, V.M.H., introduced and sent by Messrs. H. Shoesmith Ltd.) **A.M.** August 9, 1954, as a spray variety for garden decoration.—Plant 3 feet high, compact, bushy and erect. Flowers 1⅜ inch diameter, a rich brighter shade of yellow than Lemon Yellow (H.C.C. 4). [6]

Light Bronze

GEM. (Raised by Mr. H. Shoesmith, V.M.H., introduced and sent by Messrs. H. Shoesmith Ltd.) **F.C.C.** September 27, 1954, as a spray variety for garden decoration.—Described R.H.S. JOURNAL **78**, p. 69 (**A.M.** 1952). [10]

Pink

LITTLE DORRIT. (Raised by Mr. H. Shoesmith, V.M.H., introduced and sent by Messrs. H. Shoesmith, Ltd.) **F.C.C.** September 27, 1954, as a spray variety for garden decoration.—Described R.H.S. JOURNAL **79**, p. 142 (**A.M.** 1953). [11]

ELSIE. (Raised by Mr. H. Shoesmith, V.M.H., introduced and sent by Messrs. H. Shoesmith Ltd.) **A.M.** September 27, 1954, as a spray variety for garden decoration.—Plant 4 feet high, compact, bushy and erect. Flowers 2½ inches diameter, a rather dull shade of red near Erythrite Red (H.C.C. between 0027/1 and 0027), reverse cream flushed red. [18]

JANET. (Raised by Mr. H. Shoesmith, V.M.H., introduced and sent by Messrs. H. Shoesmith Ltd.) **A.M.** September 27, 1954, as a spray variety for garden decoration.—Plant 4 feet high, compact, bushy and erect. Flowers 1⅜ inch diameter, outer florets Rose Madder (H.C.C. 23/3), inner florets Rose Madder (H.C.C. 23/3) flushed bronze. [14]

(b) Dwarf

Yellow

ORANGE LAD. (Raised, introduced and sent by Messrs. J. & T. Johnson). **F.C.C.** August 9, 1954, as a spray variety for garden decoration.—Described R.H.S. JOURNAL **79**, p. 143 (**A.M.** 1953). [5]

Light Bronze

HUMPTY DUMPTY. (Raised, introduced and sent by Messrs. Napiers Stepswater Nurseries Ltd., Taunton, Somerset.) **A.M.** September 9, 1954, as a spray variety for garden decoration.—Plant 21 inches high, compact, bushy and erect. Flower 1¼ inch diameter, Chrome Yellow (H.C.C. 605/1) tinged with reddish bronze. [9]

Pink

LONDON'S PRIDE. (Raised by Mr. H. Shoesmith, V.M.H., introduced and sent by Messrs. H. Shoesmith Ltd.) **A.M.** September 9, 1954, as a spray variety for garden decoration.—Plant 22 inches high, compact, very bushy and erect. Flower 1 3/16 inch diameter, outer florets near Magenta Rose (H.C.C. 027/2), inner florets near Magenta Rose (H.C.C. 027/2) tinged with bronze. [16]

VIOLA

Sixteen stocks of Viola were received at Wisley during the spring of 1953. Six plants of each stock were planted. A sub-committee of the Floral Committee A inspected the trial on May 27, 1953 and June 22, 1954 and on its recommendation the Council of The Royal Horticultural Society has made the following award.

The number in brackets after the description of the stock was that under which it was grown in the trial.

AVRIL LAWSON. (Raised by G. Lawson Esq., Angus, Scotland, introduced and sent by Messrs. S. Pedley & Sons, Ovenden Wood Nursery, Pellon, Halifax, Yorks.) **H.C.** June 22, 1954.—Plant 12 inches high, vigorous, tufted; flower 1½ inch diameter, a brighter shade of violet than Campanula Violet (H.C.C. 37); eye yellow veined black. [30]

DIGITALIS

Eight stocks of Digitalis were received in 1953 for trial at Wisley. The trial was sown under glass on June 15, 1953, and pricked out into boxes on June 26. The trial was planted in the open ground on August 20, 1953.

The trial was inspected by a sub-committee of the Floral Committee A on June 10 and 22, 1954, and on its recommendation the Council of The Royal Horticultural Society has made the following awards.

The number in brackets after the description of the stock was that under which it was grown in the trial.

EXCELSIOR CREAM. (Raised, introduced and sent by Messrs. Sutton & Sons Ltd., The Royal Seed Establishment, Reading, Berks.) **F.C.C.** June 22, 1954. Plant 5½ feet high, erect; stem stout, rigid; inflorescence 3 feet long, 7 inches diameter at base, flowers neatly spaced all round; flower 2½ inches long, 1⅝ inch diameter, held erect, buds opening Primrose Yellow (H.C.C. 601/2) fading to cream when fully out. [2]

EXCELSIOR HYBRIDS. (Raised, introduced and sent by Messrs. Sutton & Sons Ltd.) **F.C.C.** June 22, 1954. Plant 6 feet high, erect; stem stout, rigid; inflorescence 3½ feet long, 6½ inches diameter at base, flowers neatly spaced all round; flower 2½ inches long, 1⅜ inch diameter, held erect, colours include white, cream, rosy pink, magenta and shades of purple all spotted heavily with purple. [8]

MARSHALL'S WHITE. (Sent by Messrs. Dobbie & Co. Ltd., The Scottish Seed Establishment, Edinburgh, 7.) **A.M.** June 22, 1954. Plant 8 feet high, erect; stem stout, rigid; inflorescence 4 feet long, 4½ inches diameter at base, flowers spaced all round; flower 2½ inches long, 1½ inch diameter, drooping, buds cream opening to white with light brown spotting. [1]

MONSTROSA MIXED. (Sent by Messrs. Watkins & Simpson Ltd., 26–29 Drury Lane, Covent Garden, London, W.C. 2.) **A.M.** June 22, 1954. Plant 7½ feet high, erect; stem stout, rigid; inflorescence 3¾ feet long, 5 inches diameter at base, flowers spaced all round; flower 2¾ inches long, 1¾ inch diameter, drooping, colours include white, rosy pink and shades of purple all spotted with purple. [5]

GIANT SPOTTED. (Introduced and sent by Messrs. Harrison & Sons (Maidstone) Ltd., Maidstone, Kent.) **H.C.** June 22, 1954. Plant 7½ feet high, erect; stem stout, rigid; inflorescence 3¾ feet long, 5 inches diameter at base, flowers placed on one side; flower 2½ inches long, 1¾ inch diameter, drooping, colours include white, rosy pink and shades of purple all spotted heavily with purple. [7]

PERENNIAL ASTER

Seventy-nine stocks of perennial aster (Michaelmas daisy) were grown at Wisley in 1954; many of these have received awards in previous years and were grown to compare with the new stocks of which this year there were seventeen. The trial was inspected by a sub-committee of the Floral Committee A on September 17 and 27, 1954 and on its recommendation the Council of The Royal Horticultural Society has made the following awards.

The number in brackets after the description of the variety was that under which it was grown in the trial.

Novi-Belgi Group

ROSEBUD. (Raised and introduced by Mr. E. Ballard and sent by Messrs. The Old Court Nurseries Ltd., Colwall, Malvern, Worcestershire.) **F.C.C.** September 27, 1954.—Described R.H.S. JOURNAL **68,** p. 69 (**A.M.** 1952). [22]

AUDREY. (Sent by Messrs. Gayborder Nurseries Ltd., Melbourne, Derbyshire.) **A.M.** September 27, 1954.—Described R.H.S. JOURNAL **68,** p. 69 (**H.C.** 1952). [21]

ROYAL VELVET. (Raised by Mr. Alan Bloom, introduced and sent by Messrs. Blooms Nurseries Ltd., Bressingham, Diss, Norfolk.) **A.M.** September 27, 1954.—Plant 3 feet high, compact, erect, bushy habit. Flowers 1½ inch diameter, semi-double, near Amethyst Violet (H.C.C. 35). [28]

APPLE BLOSSOM. (Raised, introduced and sent by Messrs. The Old Court Nurseries Ltd.) **H.C.** September 27, 1954.—Plant 4½ feet high, compact, erect, bushy habit. Flower 1$\frac{1}{10}$ inch diameter, semi-double, Cobalt Violet (H.C.C. 634/3). [36]

EVENTIDE. (Raised and introduced by Mr. E. Ballard and sent by Messrs. The Old Court Nurseries Ltd.) **H.C.** September 17, 1954.—Plant

4 feet high, compact, erect habit. Flowers 2½ inches diameter, semi-double, near Aster Violet (H.C.C 38/1). [60]

JOHN SHEARER. (Raised, introduced and sent by Mr. George Murray, Boquhan Nurseries, Kippen, by Stirling.) **H.C.** September 17, 1954.—Plant 4½ feet high, compact, erect habit. Flowers 1½ inch diameter, semi-double, Violet (H.C.C. 36). [57]

TAPESTRY. (Raised, introduced and sent by Messrs. The Old Court Nurseries Ltd.) **H.C.** September 17, 1954.—Plant 4 feet high, compact, erect habit. Flowers 2 inches diameter, semi-double, Mauve (H.C.C. 633/1). [36]

Amellus Group

LADY HINDLIP. (Introduced and sent by Messrs. T. Carlile (Loddon Nurseries) Ltd., Carlile's Corner, Twyford, Berkshire.) **A.M.** September 27, 1954.—Plant 2 feet high, very compact, bushy habit. Flowers 2½ inches diameter, semi-double, Cobalt Violet (H.C.C. 634/1). [11]

ORION. (Introduced and sent by Messrs. T. Carlile (Loddon Nurseries) Ltd.) **H.C.** September 27, 1954.—Plant 2½ feet high, compact, erect habit. Flowers 2½ inches diameter, semi-double, near Aster Violet (H.C.C. 38/1). [13]

PLANTS TO WHICH AWARDS HAVE BEEN MADE IN 1954

Rosa macrantha 'Raubritter' A.M. July, 13, 1954. A very charming rose of spreading habit, suitable for growing on a bank or in the front of the shrub border. The flowers are of cupped shape, semi-double, 2 inches across, pale silvery blush-pink outside and Persian Rose (H.C.C. 628/1) inside, and are carried in flattish clusters of about ten at the ends of short lateral branchlets. Exhibited by Messrs. T. Hilling & Co., Chobham, Woking.

Rose 'Bayadere' A.M. September 7, 1954. A vigorous H.T. variety of good form with a rich tea scent. Its colour is near bright Empire Rose (H.C.C. 0621) becoming Indian Yellow (H.C.C. 6) at the base of the petals and having a maize yellow reverse. Raised in France by M. MALLERIN, introduced and exhibited by Messrs. Wheatcroft Bros., Ltd., Ruddington, Nottingham.

Rose 'Konrad Adenauer' A.M. September 7, 1954. A very fragrant rose with well-shaped, broad-petalled flowers of good substance and excellent form. The velvety colour is near Cardinal Red (H.C.C. 822/3). Raised in Germany by M. TANTAU, introduced and exhibited by Messrs. Wheatcroft Bros., Ltd., Ruddington, Nottingham.

Solanum macranthum A.M. August 10, 1954. An arborescent species, native of Brazil, suitable only for the larger greenhouse. It has large, alternate, lobed leaves prickly on the veins. The pale, bluish-purple flowers, each nearly 2 inches in diameter, are borne in compact clusters. The species is figured in the *Botanical Magazine* (t. 4138). Exhibited by L. Maurice Mason, Esq., Talbot Manor, Fincham, King's Lynn.

Tapeinochilus Ananassae A.M. July 27, 1954. A remarkable stove plant native to islands off the coast of New Guinea and introduced in 1933. It produces a copiously branched stem up to 6 feet in height bearing glossy, dark green, obovate leaves 6 or 8 inches long. The club-shaped inflorescence, about 8 inches long, is at the tip of a leafless, erect peduncle from 2 to 4 feet tall, and consists of a great number of thick and stiff recurving scarlet bracts among which the dull yellow flowers are just visible. Exhibited by L. Maurice Mason Esq., Talbot Manor, Fincham, King's Lynn.

Veronica salicifolia 'Spender's Seedling' A.M. July 27, 1954. A very useful summer-flowering shrub of modest size and compact habit, bearing an abundance of small white flowers in cylindical racemes up to 4 inches long. Exhibited by L. Maurice Mason, Esq., Talbot Manor, Fincham, King's Lynn.

Weigela 'Bristol Ruby' A.M. June 15, 1954. A good variety of this popular summer-flowering shrub, with large, bright ruby-red flowers. Exhibited by Messrs. T. Hilling & Co., Chobham, Woking.

Worsleya procera F.C.C. July 27, 1954. A very uncommon Brazilian Amaryllid closely allied to *Hippeastrum*, but differing from the species of that genus in its seed structure and flower colour. The plant produces a dozen or more leathery, falcate leaves over a yard long, their bases forming a sub-erect false stem about 3 feet high. This is slightly exceeded by the flattened peduncle, which carries about six flowers subtended by two long green spathes. The perianth is trumpet-shaped, 6 inches long, with six oblanceolate, undulate segments with spreading tips. Their upper part is bright Heliotrope (H.C.C. 636/1) becoming spotted with the same colour in the middle portion inside and passing to white at the base. The colour extends to the base on the outside of the segments. Exhibited by Major A. Pam, O.B.E., M.A., F.L.S., V.M.H., Wormley Bury, Broxbourne, Herts.

BOOK NOTES

"Wild Flowers of Western Pennsylvania and the Upper Ohio Basin." Text by O. E. Jennings. Watercolours by Andrey Avinoff. Large 4to. Vol. I, text, 574 pp. Vol. II, 200 plates. (University of Pittsburgh Press.) $60.

A *de luxe* Flora, designed to please both professional and amateur botanists, is still a rarity though it may be a portent. These remarkable volumes, 3,000 copies of which have been printed by means of a Buhl Foundation grant to the Carnegie Institute and University of Pittsburgh, almost suggest a new era of cultured prosperity. The authors, Otto Jennings (botanist) and Andrey Avinoff (artist), have both in their time been directors of the Carnegie Museum of Pittsburgh. The former has been studying the plants of his region for fifty years while the latter, who died in 1949, was a refugee from the Russian Revolution who reached America in 1917.

The area covered by this book, which sets a new standard for regional floras, consists of Western Pennsylvania with adjacent parts of New York, Ohio, West Virginia and Maryland; and it may seem surprising, but is stated as a fact, that as late as 1904, Western Pennsylvania with its diversity of climate, topography and soils, was still "for the most part unexplored botanically." 2,260 species are recognized, of which 705

(nearly one-third) are introduced. Descriptions, keys and notes on habitat and distribution follow the lines of modern scientific floras, and there are the usual chapters on the history of exploration, geology, climate and plant geography of the region. The work is largely based on the specimens in the herbarium of the Botanical Society of Western Pennsylvania which is housed in the Carnegie Museum, but the help of specialists in critical genera is acknowledged. An interesting feature of the text is the 146 distribution maps of individual species selected for their rarity or interest (ubiquitous species are excluded), distribution being shown by a single large black dot placed at a certain point within the blank area of a county.

The 200 plates with descriptive text, which fill the second volume, are reproductions "in full 3-color sheet fed gravure" of life-size watercolour drawings of living specimens brought to the artist by the botanist and his friends. The claim of the introduction that the life cycle of the plant is revealed "from seed to fruit and on through seed to fruit again" is scarcely borne out by these plates, which show no true dissections and few fruits and seeds. But even if they do not do justice to the originals, they will give much pleasure as accurate and attractive representations, and the volume must not be missed by our critics and collectors of beautiful flower-books.

N. Y. SANDWITH

"Berried Treasure." By F. Kingdon-Ward, O.B.E., F.L.S. 192 pp. Illus. (Ward Lock & Co. Ltd.) 25*s*.

In this book of twenty chapters the author states in his foreword that he may be able to help those whose gardens are not as attractive as they would wish them to be after the flush of flowers is over.

He is to be thanked warmly for bringing together in such a readily accessible manner so much valuable information about many of the best trees and shrubs grown first and foremost for their berries.

Those who delve into the pages will agree that he has achieved his object, and this in the attractive style of language which we have all come to expect from him. Professional gardeners will not agree with the dimensions given for a standard tree on page 69. There is a serious vein under the light touch where he appears to skip round the botanical description of a berry. This, coupled with the botanical grouping at the end of the book giving the colours of the berries of the many plants he mentions, leaves little doubt in my mind that we are intended to regard not too lightly the botanical leaning which appears now and then.

This leaning may have led him to disregard, as he has done, some of the finest of all berried treasures, such as *Berberis rubrostilla* and *Cotoneaster cornubia*, because they are not true species.

I was surprised to find several errors in the spelling of plant names, e.g., *Rodgersiana* and *Moyesisii* on plates 15 and 16, and *Crataegus concinoides* for *coccinoides* on page 93, with others, particularly in the index.

There is a coloured frontispiece illustrating four very attractive shrubs and twenty-four black-and-white plates. Two of the names given with these should be corrected; viz. *Euonymus japonicus* appears to be *radicans variegatus* instead of *japonicus* on plate 8, while plate 18 does not illustrate *Sorbus hybrida* as I understand it.

The author spurs the reader on by stating frankly that while he considers nearly all the plants he mentions are in cultivation, some may not be readily available from nurserymen. I have been trying not to write *Buried Treasure* but there seems to be some excuse for saying here "seek and ye shall find." It is to be hoped, however, that there is no widespread plantings of *Berberis vulgaris* because it acts as a host plant for the fungus which causes Wheat Rust at one stage in its life cycle.

F. P. KNIGHT

"The Gardeners' Album." Edited by Miles Hadfield. 175 pp. Illus. (Hulton Press.) 25*s*.

Taking from his model the "annuals," not horticultural, but literary, which diverted society in the couple of decades or so after Waterloo, Mr. Miles Hadfield has gathered together in *The Gardeners' Album*, contributions by some of the most distinguished horticulturists and writers on gardening matters of the day, and has produced a book which gives nothing but pleasure. Glancing at the names of the contributors prompts the arresting thought that so many eminent gardeners are also such accomplished writers of the English language.

Pre-eminent among these is, of course, Miss V. Sackville-West, who writes on her garden, already well-known in these pages, at Sissinghurst Castle. Mr. Wilfrid Blunt gives an entertaining account of the introduction of the Water-lily *Victoria amazonica*, illustrated with reproductions of coloured lithographs by Walter Fitch. Four expert cultivators, Mrs. Anley, Mr. Montagu Allwood, Mr. Will Ingwersen and Mr. A. T. Johnson write about "Their most successful Plants"; Mr. Handaside Buchanan on collecting flower books.

These few names alone given indicate the range and authority of the articles in this book, for a review cannot become a mere list of contributors. It has just to be stated that they could not have been better chosen or have written more entertainingly on the subjects they understand so well.

Mr. Geoffrey Taylor's article on "The Personality of Gardeners" must, however, receive particular comment for this writer is unique in having made this subject a special study—and a worthy one it is. It is greatly to be hoped that Mr. Taylor will pursue his research into the figures which adorn the history of horticulture, while information about them is still to be gathered.

The splendid illustrations are a notable feature. There are twenty-four full-page colour plates including fifteen very fair reproductions from Thornton's *Temple of Flora*. The twenty-four pages of photographs of flowers and gardens are vivid and excellent.

A high standard of book production is attained in this volume and happy the recipient of it as a present.

MORTON

"Chrysanthemums for Garden and Exhibition." By John Woolman. 112 pp. Illus. (Published W. H. & L. Collingridge Ltd.) Price 10*s*. 6*d*.

From the pen of John Woolman one would naturally expect to get a wonderful lot of information on chrysanthemum growing. Perhaps no one has had such a wide experience in raising, growing and distributing all the types cultivated by trade and amateur growers in this country. *Chrysanthemums for Garden and Exhibition* does not disappoint us for it is a veritable mine of information. It would take too long to go through it and praise it chapter by chapter but I would like to stress one particular point he makes—that is the need for chrysanthemums to be grown in an open position as they require all the air and sunlight they can get. During this last season people who have grown chrysanthemums in so-called "protected" positions have come upon an awful lot of troubles.

It is interesting to see that in Mr. Woolman's selection of varieties he has not forgotten many of the older ones which have not yet been superseded. One might have expected a raiser to have concentrated on the newer introductions; but Mr. Woolman is a man who really knows a good chrysanthemum and is not misled by novelty.

In his historical notes much is said about the raisers of Japan and China and some of the earlier European introductions, with special note of the English raisers of the last thirty or forty years, but nothing is said about that grand Australian raiser, T. W. Pockett, who has been responsible for the raising of so many of our best and largest exhibition chrysanthemums.

I have read the book with considerable interest and have been surprised upon how many of the main points Mr. Woolman and I agree wholeheartedly (Mr. Woolman being mainly interested in growing for the retail plant trade—myself for the wholesale flower market). Many readers will perhaps differ when it comes to minor details.

It is unfortunate that three of the many excellent illustrations bear the wrong captions. No doubt these will be corrected in future editions.

I would challenge Mr. Woolman's claim to have produced the first perpetual flowering chrysanthemum, for 'Pluie d'Argent' has been grown in this country for over forty years. I do not know when its yellow sport was first selected but this also has been in cultivation for a long time. It is a pity to see such good old friends renamed.

This is an excellent book and will be useful both to the novice and to the most expert of experienced growers.

JOHN B. STEVENSON

"History of the Rose." By Roy E. Shepherd. Demy 8vo, 264 pp. Illus. (Macmillan of New York, 10, South Audley St., London, W. 1.) 33*s*.

In his introduction Mr. Shepherd states that during the past twenty-five years he has collected and grown all the obtainable species and old roses and many of the modern ones. It would be obvious to anyone who picked up this book of 264 pages that some

such effort had been made for the writer to become so well acquainted with such an astonishing array of roses. This book is indeed a very great effort, a tireless effort of real value to all rose students and enthusiasts; it is extremely comprehensive; historical and botanical notes regarding many species and their groups of well-known or obscure hybrids being faithfully and carefully recorded, in a style both lucid and pleasing and devoid of romance or extravagance.

Red on green is never a happy combination; the colour, therefore, of the cover is my only criticism of the production of the book, which is excellently printed; the photographs are mostly poor and not at all what one expects from an American publication. Some species are unrecognizable, such as *R. gallica officinalis*. A collection of really good photographs including typical representatives of the principal groups would have added greatly to the value of the book.

There are a few omissions of notable historic roses, such as the 'Perpetual White Damask Moss'; I have also failed to find the unique 'japonica' variety of *R. centifolia muscosa* mentioned. The great rugosa race is disposed of in six pages; Dr. C. C. Hurst is given a very brief mention—in fact, his conclusions seem to have had little effect on Mr. Shepherd's reasonings; the statement that *Rosa moschata* rarely exceeds 10 feet in England needs some modification; there are a few typographical errors and some page reference omissions. A comprehensive bibliography and index, and also a most interesting table have been included; the latter shows the dominance in horticulture of different groups of roses since A.D. 1600. I must get this book at once for my own rose library.

GRAHAM THOMAS

"Fruits, Their Characters and Qualities." English translation by Miss P. Rowe-Dutton. (Published by the Office National des Debouches Agricoles et Horticoles, Brussels, 1954). Illus. in colour. Price £4 10*s*.

As the introduction to this handsome book states, it is intended for "all those interested in our fruit industry," and although there must necessarily be matter that can be of interest only to Belgians, there is still much that will be of use to the British reader.

The book consists mainly of descriptions and illustrations, both coloured and line, of the principal established and promising varieties grown in Belgium today. The well set out descriptions are generally clear, in spite of occasional confusion of wording and unusual terminology. They include, besides pomological descriptions, synonyms, notes on origin, commercial, cultural and physiological characters. Detailed line drawings serve instead of descriptions of leaves, shoots, etc., and any shortcomings in the coloured plates are disarmingly acknowledged in the introduction.

The small number of soft fruits dealt with is disappointing although stone fruits are better represented, but the arrangement of this section is confusing with the line drawing of one variety opposite the description of the next. The second half of the book, dealing with pears and apples, is well arranged, the pear section being probably the best in the book from the British point of view. The fruit amateur would find this a useful book within the limits of the eighty-eight varieties described.

J. M. S. POTTER

ERRATUM

Wisley Trials 1954. Rhododendron. Rhododendron 'Mrs. A. M. Williams' was sent by Messrs. Van Nes, Boskoop, Holland, and not by Messrs. Koster & Sons, Boskoop, Holland. See R.H.S. JOURNAL 79, page 542 (November 1954).

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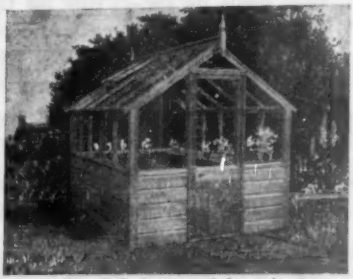

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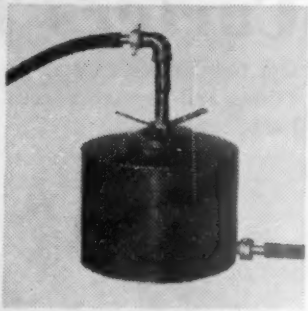

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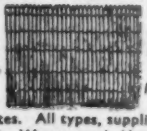

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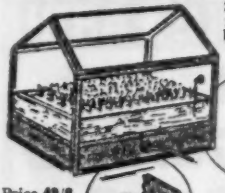

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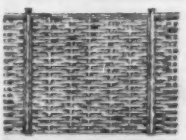

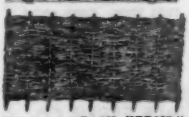

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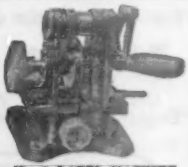

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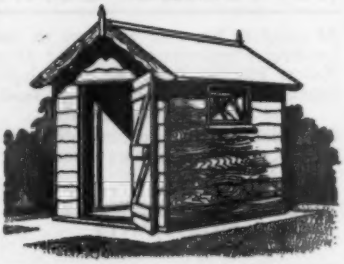

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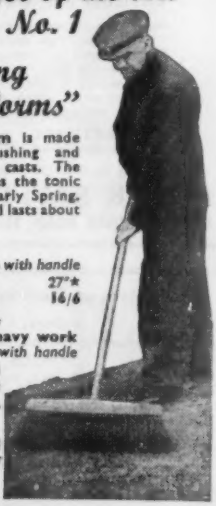

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